# Imperial Bureau of Plant Breeding and Genetics

## Plant Breeding Abstracts

Vol. XV, No. 4

(Abstracts Nos 1215—1539)

School of Agriculture
Cambridge
England

1st October, 1945

# TABLE OF CONTENTS


| | | PAGE |
|---|---|---|
| 519 | Statistics* | 318 |
| 57 | Biological Sciences | 318 |
| 575 | Breeding* (Empire) | 297 |
| | (Foreign) | 318 |
| 575.1 | Genetics* (Empire) | 301 |
| | (Foreign) | 326 |
| 575.2 | Variations, Modifications, Mutations | 327 |
| 576.1 | Origin of Species (Empire) | 301 |
| | (Foreign) | 328 |
| 576.3 | Cytology* (Empire) | 301 |
| | (Foreign) | 329 |
| 58 | Botany* (Empire) | 301 |
| | (Foreign) | 330 |
| 6 | Applied Sciences | 302 |
| 63 | Agriculture | 332 |
| 632 | Plant Diseases and Pests* (Empire) | 302 |
| | (Foreign) | 332 |
| 633 | Economic Plants (Empire) | 303 |
| | (Foreign) | 334 |
| 633.1 | Cereals (Empire) | 303 |
| | (Foreign) | 336 |
| 633.11 | Wheat (Empire) | 304 |
| | (Foreign) | 336 |
| 633.12 | Buckwheat | 341 |
| 633.13 | Oats (Empire) | 305 |
| | (Foreign) | 342 |
| 633.14 | Rye | 343 |
| 633.15 | Maize (Empire) | 305 |
| | (Foreign) | 344 |
| 633.16 | Barley (Empire) | 305 |
| | (Foreign) | 346 |
| 633.17 | Millets and Sorghum | 349 |
| 633.18 | Rice (Empire) | 306 |
| | (Foreign) | 350 |
| 633.2 | Forage Grasses (Empire) | 306 |
| | (Foreign) | 350 |
| 633.3 | Leguminous Forage Plants (Empire) | 306 |
| | (Foreign) | 351 |
| 633.4 | Roots and Tubers (Empire) | 307 |
| | (Foreign) | 353 |
| 633.5 | Fibres (Empire) | 307 |
| | (Foreign) | 356 |
| 633.6 | Sugar Plants (Empire) | 312 |
| | (Foreign) | 357 |
| 633.7 | Stimulants (Empire) | 312 |
| | (Foreign) | 358 |
| 633.84 | Condiments (Empire) | 313 |
| | (Foreign) | 359 |
| 633.85 | Oil Plants (Empire) | 313 |
| | (Foreign) | 359 |
| 633.88 | Medicinal Plants (Empire) | 314 |
| | (Foreign) | 359 |
| 633.91 | Rubber Plants | 360 |
| 634 | Fruits and Nuts (Empire) | 314 |
| | (Foreign) | 360 |
| 634.9 | Forestry (Empire) | 316 |
| | (Foreign) | 365 |
| 635 | Vegetables (Empire) | 316 |
| | (Foreign) | 367 |
| | Book Reviews | 372 |


*Note.*—Initialled abstracts are written by the following:—

Dr S. Ellerton .. .. .. .. .. .. S. E.
Mr J. L. Fyfe .. .. .. .. .. .. .. J. L. F.
Dr J. G. Hawkes .. .. .. .. .. .. J. G. H.
Mr I. Zacopanay .. .. .. .. .. .. I. Z.

* General studies, see also individual crops.

# Plant Breeding Abstracts

## Vol. XV, No. 4

## Part I. Empire Section

### *BREEDING 575

1215. 575:633
575.1:576.354.4

**35th Annual Report of the John Innes Horticultural Institution 1944** (1945) : Pp. 24.

**Seed production**

Observations on isolation requirements of seed crops have been made with turnip, radish, barley, French bean, beet and maize. In cross-pollinated species, whether by wind or insects, contamination falls off rapidly with distance at first, but over greater distances the fall is more gradual. In wind-pollinated plants, the fall in contamination continues up to the greatest distance under observation. In insect-pollinated plants, however, there is no evidence of reduction in the small amount of contamination occurring at greater distances. In radish, for instance, the small amount of contamination occurring between distances of 160 to 580 ft. remained steady.

No natural crossing has so far been observed in barley. In French beans, sporadic inter-varietal hybridization has been observed when different varieties are planted in adjacent rows.

**Genetics and cytology**

A comparison of diploid and induced tetraploid forms of *Cicer* has shown that a degree of specificity is conferred on heterochromatic pairing owing to the position of homologous chromosomes at early prophase. Four such chromosomes that are primarily associated as bivalents after diplotene are likely also to be secondarily associated since they form a potential quadrivalent at early prophase. The association is often so close that it cannot be readily distinguished from the formation of true quadrivalents. It is pointed out that these observations must be considered in determining the chromosome constitution of polyploid plants such as the potato.

Investigation of polygenic action in the X chromosome of *Drosophila melonogaster* has shown activity of this nature at both ends of the chromosome, but so far, none has been observed in the euchromatic central portion. The results of a further experiment suggest that the activity of polygenes depends upon their organization and arrangement within the chromosomes in a manner somewhat similar to the operation of position effects.

A number of plant species have been examined for the presence of heterochromatin in the resting nuclei of roots and ovaries. In the majority of the species no detectable heterochromatin was found. In some species heterochromatin was present in supernumerary fragments and absent from the major chromosomes; in other species the reverse was found to be the case. Wherever the heterochromatic segments were large enough, they gave in all cases visible evidence of nucleic acid starvation in cold.

The new lacmoid squash method has made possible the examination of tissues which have hitherto been inaccessible. Various types of pre-leptotene resting stages in anthers and embryo-sacs have been studied by means of this method.

A brief discussion is given of the application and extension of methods of biometrical analyses developed by Fisher, Immer and Tedin to a number of experimental problems in recent years.

**Potato**

A study has been made of the "bolter" and "wilding" abnormalities. The difficulties of obtaining seed were partly overcome by the application of 1% α-naphthalene acetamide in lanolin to the ovaries and pedicels, which resulted in the stimulation of ovary growth and an increased set of fruit. The viability of the pollen was studied, and found to be very low at the beginning of the flowering period. Cytological examination has revealed no major abnormalities in the "bolter" and "wilding" forms.

A tetraploid form of the wild diploid *S. polyadenium* has been produced which shows resistance to aphid attack. It is proposed to introduce this character into the cultivated potato.

---

* General studies, see also individual crops.

**Tobacco**

The yield of nicotine from *N. rustica* has been found to be much the same at Merton as that reported from the eastern United States. Olsen 68 was the best variety grown. Inter-strain hybrids are now being grown.

**Raspberry**

In an attempt to overcome the effects of virus, experiments are being carried out to make use of the advantages of sexual reproduction. The main breeding problems are now apparent from a preliminary randomized block trial of five hybrid strains and two clonal varieties, Norfolk Giant and Lloyd George. In the hybrids, yield was satisfactory, but too much variation was shown from the commercial point of view in the depth of colour and firmness of fruit. Further selection and larger trials are in progress with the object of reducing this variability. Norfolk Giant gave good results, but Lloyd George grew badly owing to virus infection.

**Radish**

A study has been made of the genetics of self-incompatibility. Incompatible groups have been analysed, which fit into the multiple *S* allele system of the *Nicotiana* type. At least three alleles occurred in the material studied. One family obtained by self-pollination at a pseudo-fertile period contained $S_1S_3$ and $S_1S_1$ plants; the homozygous $S_3S_3$ was not found and was presumed to be lethal. A fully self-compatible plant was found in the variety Scarlet Globe. Self-incompatible plants resulting from the selfed progeny of the plant were of two types, $S_1S_2$ and $S_2S_2$. It appears that self-compatibility is controlled by a major gene *C* which is not allelomorphic with the *S* series, and which, in pollen from a heterozygote for *C*, counteracts the interaction of the *S* alleles. Furthermore, incompatibility in certain crosses between $CcS_1S_2$ and $ccS_1S_2$ indicates that the gene *C* has little or no effect when present in the style only. Further investigation of the action of this gene and its origin is in progress.

**Tomato**

Breeding work has been carried out for resistance to *Cladosporium.* The resistant varieties, Vetomold, Clarke's Leaf-mould Resister and Bewley's Leaf-mould Resister have been used. In the first two varieties, resistance behaves as a dominant character, in Bewley's Leaf-mould Resister as a recessive. Results from $F_2$ progenies suggest that at least three genes are involved in the determination of resistance.

A study is being made of dwarf and bush varieties. Natural cross-pollination appears to be frequent in the bush varieties, being facilitated by the exposure of the female organ in many flowers. The frequency of natural crossing and the spatial isolation necessary for varietal purity are being investigated. Low-yielding early and heavy-yielding late bush forms are being crossed for the purpose of breeding new types.

In the study of rogues, correlation has been found for a given variety between type of plant and rogue-producing properties. Extreme rogue types and extreme non-rogue types yield the highest proportion of their own types. Intermediate types, however, are very irregular in their behaviour. Satisfactory classification of plant type can only be achieved during the early stages of growth.

**Bean**

$F_2$ and $F_3$ families of crosses between French and runner beans show promise of providing strains which combine the runner type of inflorescence held well above the foliage with the habit of the French bean. An $F_1$ runner bean plant treated with colchicine gave several tetraploid progeny which had the general habit of the diploid parent but were more compact. They showed some segregation for fertility, habit and colour. Colchicine-induced tetraploid forms of pure French beans showed a considerable reduction in vigour and fertility.

**Sweet corn**

Varietal differences have been shown in the ability to germinate and survive following sowing in March in open ground. The derivatives of crosses between varieties of sweet corn and certain native Peruvian maize strains showed marked hardiness.

1216. Sen, S. N. 575:633(54)

**Plant breeding in India.**

Sci. and Cult. 1944 : **10** : 110–11.

A review is presented of the survey published by Darlington on plant breeding in India. The great importance of plant breeding in contributing to the solution of India's nutritional problems is emphasized.

1217. 575:633(54.7)

**The fourth annual report of the governing body of the Institute of Agriculture, Animal Husbandry and Dairying, Anand, for the period ended 31st March, 1944.**

Gen. Ser. Bull. Inst. Agric. Anand 1945 : No. 4 : Pp. 43.

Selection work in cumin, fennel and sorghum is to be continued. A report is given of trials of the Hyderabad castor oil plant strains, S.S.1, P.B.1, and W.115, and the local strain, S.20.

1218. ARNOLD, H. C. 575:633(68.9)

**Agricultural Experiment Station, Salisbury. Annual report of experiments, season 1943–44.**

Rhod. Agric. J. 1945 : **42** : 129–42.

**Maize**

A number of strains of the variety Hickory King have been selected for inbreeding with the object of producing eight-row hybrids.

A second cycle of inbreeding is reported, to obtain improved inbreds for the production of adapted hybrid or synthetic varieties. First cycle inbreds have been tested in single and double crosses and top-crosses (variety x inbred). Approximately equal yields were obtained from the top-crosses and double crosses. It is suggested that the top-cross may be the most suitable hybrid combination for local conditions.

**Velvet bean**

By crossing Jubilack and Golben it is hoped to obtain strains which give high yields of fodder and viable seed.

**Soya bean**

Promising single plant selections have been obtained from crosses of strains of the variety Hernon with Potchefstroom No. 184, which give higher yields than Hernon No. 107 and retain the ripe seed in the pods for a longer period.

1219. 575:633(72.92)

**Annual report of the Department of Agriculture, Jamaica, for the year ended 31st March, 1944.**

Kingston 1945 : Pp. 16.

**Maize**

A yellow maize suitable for meal manufacture has been developed by continued mass selection; dark pericarp colour has, for practical purposes, been eliminated. Three new varieties are being mass selected. Single hybrids have been produced from a number of inbred lines, and are being selected with the object of developing synthetic varieties.

**Sugar cane**

Recently imported cane varieties were distributed. A test of reaction to mosaic among varieties of the series B39 has been made.

**Cassava**

Experiments are in progress to determine the effect of varietal and other factors upon yield and chemical composition.

**Avocado**

Trials were made to determine which varieties are affected by the disease of "internal breakdown" under cold storage conditions. Varieties of the Mexican race (Gottfried), Mexican x Guatemalan (Fuerte), Mexican x an unknown cross (Eagle Rock) and Guatemalan x an unknown cross (Linda) were unaffected. Varieties of the West Indian race and crosses between the West Indian and Guatemalan races suffered from the disease.

**Banana**

The main work has been directed towards the development of varieties resistant to Panama and leaf spot diseases.

In addition to the established primary crosses, crosses have been made of *M. nagensium* and an unnamed species from Burma (Tagwin 3) with Gros Michel. A variety of *M. Cavendishii* has failed to produce seed when crossed with a number of wild diploid varieties. The crossing of $F_1$ primary tetraploids has been continued, but no seedlings of particular promise have been obtained. Of the 2100 new seedlings raised, 1447 are derived from crosses of this type; the

remainder are primary tetraploids from crosses of Gros Michel varieties with disease resistant wild types; 80 preliminary selections have been made for further trial. Seed of a new clone of *M. acuminata* (Long Tavoy) showing promise as a male parent has germinated.
In seedling variety trials carried on into the second ratoon crop, the best varieties have given a heavy yield of superior but short fingered fruit. Routine testing of seedling varieties for resistance to Panama disease is being continued. Trials of the resistant variety S.A.1 are not yet sufficiently complete for any statement as to its potentialities.

**Soya bean**
A black-seeded type has been found among plants of the variety Palmetto.

1220. 575:633(94)

**Eighteenth Annual Report of the Council for Scientific and Industrial Research, Australia, for the year ended 30th June, 1944** : Pp. 78.

**Forage grasses**
Selection work with Veldt grass, which has as its object the production of strains with non-shattering seed heads, has been continued.
A study of the flowering and seed-setting habits of *Danthonia* and the development of a hybridization technique are in progress at Canberra. Trials indicate that *Danthonia* is probably self-fertilized to a considerable extent. Selected material of a number of species is being maintained.

**Leguminous forage crops**
In a survival test of lucerne in southern Queensland, the only material to exceed the commercial check variety in persistence has been derived from selections within Australian ecotypes. Disease resistance studies have been continued.
In Queensland, varieties of *Dolichos, Vigna* and *Phaseolus* and the sword bean, *Canavalia ensiformis,* continue to show promise as green manure plants.

**Beetroot**
Studies of varietal variation under several environmental conditions are being carried out. The relative influence of genetic and environmental factors on the development of white rings is under investigation.

**Potato**
Breeding for resistance to viruses A, X, Y, and leaf roll is being continued.

**Poppy**
Considerable differences in time of maturity, yield of dry matter and morphine content have been found in varieties of *P. somniferum.*

**Carrot**
A study of varietal variation under several environmental conditions is in progress. The relative influence of genetic and environmental factors on the development of red core is being investigated.

**Cabbage**
The variety Succession is being selected to produce a uniform strain giving a high yield of marketable heads.

**Tomato**
Hybrids combining desirable agronomic characters and resistance to *Fusarium* wilt and leaf mould are being developed.

**Bean**
Hybrids combining desirable agronomic qualities with resistance to *Fusarium,* bean mosaic, halo blight and anthracnose are being developed.

**Pigeon pea**
A trial of introduced varieties of the pigeon pea is in progress, with a view to its possible use as a pasture legume.

**Soya bean**
Introduced varieties of soya bean are under observation for the purposes of a future selection and breeding programme.

**Pyrethrum**
Selection has been made of five types, based upon vegetative characters desirable for mechanical harvesting.

## *GENETICS 575.1

1221. HOROWITZ, B. 575.125:581.143.26.033.1:633.71(94)
**A note on the interaction between heterosis and photoperiodic response.**
Aust. J. Sci. 1945 : **7** : 126–27.
Observations made on *Nicotiana rustica* have suggested that the expression of heterosis under varying conditions of light during growth is influenced to a large extent by the photoperiodic reaction of the parents and that inherited by the $F_1$ progeny.

1222. DIXON, T. F. 575.17:632.8
**Autosynthetic molecules.**
Nature, Lond. 1945 : **155** : 596–98.
Recent developments in the study of virus and gene reproduction are reviewed, and the nature of the process discussed.

## ORIGIN OF SPECIES 576.1

1223. RABEL, G. 576.12:007
**Lamarck—In honour of the 200th anniversary of his birth.**
The Nineteenth Century and After 1945 : **137** : 258–64.
A short account is given of the life and scientific contributions of Lamarck, and an outline is presented of his influence on present-day biological theory.

1224. TURBIN, N. V. 576.12:575.41
**Prof. Boris Keller.**
Nature, Lond. 1945 : **155** : 702–03.
A short account is given of the achievements of Professor Keller, who has recently been awarded the Order of the Red Banner of Labour. After referring to his work on ecology and plant physiology, mention is made of his evolutionary theories which are stated to hold "that the evolution of plants does not depend on casual, isolated mutations but on the selection of those regular changes which first occur in the individual development of the plant as a regular reaction of its adaptive faculties to changes in living conditions and internal relations in the plant itself, which then bring about a reconstruction in the progeny in the direction indicated".

## *CYTOLOGY 576.3

1225. MANTON, I. 576.312.34:576.356.2
**Chromosome length at the early meiotic prophases in *Osmunda*.**
Ann. Bot. Lond. 1945 : **9** : 155–78.
Detailed studies of chromosome length in *Osmunda regalis* L. have shown that the fully extended length, and the length during mitosis and the length during meiotic metaphase are in a ratio of 4 : 2 : 1 respectively. No contraction appears to occur in meiosis until late pachytene, i.e. after pairing has begun; contraction takes place during the later stages of pairing. Chromosome length in triploid and tetraploid strains of *Osmunda* is not significantly different from that of the diploid, but pairing tends to be more complete.

1226. KOLLER, P. C. 576.35:537.531
**X-rays and cells.**
Nature, Lond. 1945 : **155** : 778–80.
A review is given of recent work on the X-irradiation of biological material. Special importance is attached to the recent developments in the elucidation of X-ray experimental data by Darlington and La Cour (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 798).

## *BOTANY 58

1227. COCKERELL, T. D. A. 582:001.4
**Problems of nomenclature.**
Nature, Lond. 1945 : **155** : p. 548.
It is recommended that the codes of botanical and zoological nomenclature be made uniform, also that *nomina seminuda*, i.e. names introduced informally, yet adopted by later workers, should not be rejected absolutely, and that subspecific names should be valid when raised to specific status. The citation of authors' names is regarded as redundant.

---

* General studies, see also individual crops.

1228. 6:061.3(42)

**The place of science in industry.**

Advanc. Sci. 1945 : **3** : 106–56.

A report is given of a conference held by the Division for the Social and International Relations of Science of the British Association to discuss the application of science to industry. The various papers will be of general interest to plant breeders especially the paper by Darlington on applied biology.

1229. HILL, A. V. 6:35(54)

**A report to the government of India on scientific research in India.**

The Royal Society, London 1945 : Pp. 55.

This valuable report on the organization and application of scientific research in India includes references to biology and agriculture, and will be of considerable interest to all those interested in the progress of plant breeding in India.

## *PLANT DISEASES AND PESTS 632

1230. VIRTANEN, A. I. 632.3:576.16

**Symbiotic nitrogen fixation.**

Nature, Lond. 1945 : **155** : 747–48.

This note on researches on nitrogen fixation carried out at Helsinki since 1940 includes references to the behaviour of different strains of the nodule bacteria of leguminous plants. In particular, it is pointed out that a strain may cause nodulation without nitrogen fixation.

1231. FRIES, N. 632.421.9:581.192:537.531:575.243

**X-ray induced mutations in the physiology of *Ophiostoma*.**

Nature, Lond. 1945 : **155** : 757–58.

Strains of *O. multiannulatum* Hedgc. et Davids. differing from the parent type in biochemical properties have been obtained by X-irradiation. Special interest attaches to the changes induced in sulphur metabolism.

1232. 632.422.3:575.1

**Heredity and the nucleus in yeasts.**

J. Inc. Brew. Guild 1945 : **31** : No. 363 : 1–5.

A popular discussion is given of the results of recent genetical and biochemical research in yeast, and of the possibilities of developing new economically valuable types by hybridization and artificial mutation.

1233. SUBRAMANIAM, M. K. and RANGANATHAN, B. 632.422.3:576.312.32:576.356.5:581.04

**The chromosome number of *Saccharomyces cerevisiae*.**

Curr. Sci. 1945 : **14** : 131–32.

Investigations of the strain S.C.9, N.C.T.C. have given consistent indication that the chromosome number is two (cf. *Plant Breeding Abstracts*, Abst. 1234 below). The suggestion is made that the differences in chromosome number observed by other authors have arisen because different races of *S. cerevisiae* have been studied. Technical methods in relation to the interpretation of results are discussed. Preliminary experiments with acenaphthene show that it is possible to produce a tetraploid or octoploid by controlling the length of treatment, and that measurements of the chromosomes of the tetraploids do not necessarily correspond with those of the chromosomes in the diploids.

1234. SUBRAMANIAM, M. K. and RANGANATHAN, B. 632.422.3:576.35

**Mitosis during budding in *Saccharomyces cerevisiae*.**

Curr. Sci. 1945 : **14** : 78–79.

An investigation has been made of the behaviour of the nucleus during budding in strain SC9 of *S. cerevisiae*. Two chromosomes were observed, and nuclear division during budding was found to be mitotic.

---

* General studies, see also individual crops.

1235. WILLIAMS, C. B. 633-2-1.521.6:575.1
**Genetics in relation to diseases of animals and plants.**
Nature, Lond. 1945 : **155** : 674–75.

This report of a joint meeting of the Association of Applied Biologists and the Genetical Society includes the following items of interest to plant breeders:—

C. D. DARLINGTON
The present tendency towards the production of homozygous crops should be modified and a certain degree of genetical heterogeneity should be re-introduced. There is recent evidence (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 780) that plants can produce self-perpetuating antibodies in response to virus diseases.

W. BLACK
Three strains of *Phytophthora infestans* have been differentiated. Immunity to strain A is determined by the gene *Ra* found in *Solanum demissum*, while immunity to strains A and B is determined by gene *Rb* found in the same species.

G. COCKERHAM
Gene *Nx* determines hypersensitivity of potatoes to several strains of virus X, and this is closely linked in several varieties to the gene *Na* which determines hypersensitivity to virus A. These two genes are not linked in the variety South Esk. Gene *Nc* determines hypersensitivity to virus C, a strain of virus Y, but hypersensitivity to the typical strain of virus Y is only found in certain wild *Solanum* species.

T. J. JENKIN
S.75 is a recently developed oat variety resistant to smut; S.81 is a white winter oat resistant to eel-worm. Clover is being selected for resistance to rot (*Sclerotinia Trifoliorum*) and eel-worm.

K. MATHER
Reference is made to Lindstrom's discovery that bacterial wilt of maize becomes more virulent by passage through resistant inbred lines, and becomes less virulent when passed through susceptible lines.

M. A. CRANE
The disadvantages of clonal crops in respect of susceptibility to disease are emphasized.

F. C. BAWDEN
The evidence for virus antibodies in plants is not regarded as sufficiently cogent.

H. W. HOWARD
Modifying genes are believed to affect the degree of resistance shown by *Solanum* lines to *Phytophthora infestans*.

R. STENTON
The ratio of diseased individuals in a mixed population might be found to be proportional to the number of recessives present.

C. B. WILLIAMS
The importance of conserving genetical variability as a means of protection against disease is re-emphasized.

## CEREALS 633.1

1236. JOHNSON, L. P. V.,
YOUNG, G. A. and 633.1:577.16:581.142(71)
MARSHALL, J. B. 635.65:577.16:581.142(71)
**A note on the production of vitamin C by sprouting seeds.**
Sci. Agric. 1945 : **25** : 499–503.

Tests were made of the vitamin C content in sprouting seeds of varieties of hull-less oats, maize, spring wheat, and several species of peas and beans. The varieties of field pea, Early Blue, O.A.C. No. 181 and Arthur, produced appreciable amounts of readily available vitamin C in 5 days.

1237. ANDERSON, J. A. and
AITKEN, T. R. 633.1:581.6
**Eighteenth Annual Report of the Board of Grain Commissioners Grain Research Laboratory, Winnipeg, Manitoba 1944** (1945) : Pp. 69.

Reports are included on the investigations of quality in varieties of hard red spring wheat, amber durum wheat, malting barley and maize grown by plant breeders in Canada in 1943. A summary is given of studies of intervarietal relations between wort properties and barley and malt properties (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 454, and Vol. XV, Abst. 815).

1238. SOUTTER, R. E. 633.11(94.3)
**Choosing wheat varieties for grain.**
Qd Agric. J. 1945 : **60** : 197–209.
Descriptions are given of eighteen varieties recommended for Queensland,

1239. 633.11:575(94.5)
SIMS, H. J. 633.253:575(94.5)
**Cereal variety trials in the Mallee, 1944.**
J. Dep. Agric. Vict. 1945 : **43** : 199–202.
The breeding programme at the Mallee Research Station has as its objectives the development of an oat variety giving good successive grazings or satisfactory yields after grazing, and the production of high yielding wheats showing improvement in several characters.

1240. 633.11:575:007(94.5)
**William Farrer centenary.**
J. Dep. Agric. Vict. 1945 : **43** : p. 202.
A note is given on the pioneer achievements in wheat breeding in Australia of William Farrer, on the occasion of the centenary of his birth.

1241. LECKIE, W. G. 633.11:575.12(68.6)
**Annual Report of the Department of Agriculture, Basutoland, for the year ending 30th September 1944** : Pp. 16.
Crosses have been made between Canadian and Talberg varieties to produce a high yielding, disease resistant wheat with good milling qualities. Promising selections in the $F_4$ generation have been obtained.

1242. SEN, B. and
CHAKRAVARTI, S. C. 633.11:581.143.26.03(54)
**Vernalisation response of Indian wheats.**
Curr. Sci. 1945 : **14** : 124–25.
Sowings were made of vernalized seeds of 18 Indian strains in October 1943 and February 1944 at Almora. For both these sowings the seeds were chilled for 67 days. In nine strains a significant earliness of over one week was observed in the normal seasonal October sowing. The response of these strains varied; a forwarding in ear emergence of up to 27·5 days was obtained in plants from vernalized seed of P. 9-D in the normal seasonal sowing. Comparison of the earliness observed in October and February sowings indicates that favourable environmental factors after sowing modify, and in some cases even completely mask, the effects of vernalization. In both sowings, plants from vernalized seed had a smaller number of tillers than the controls. Experiments are in progress to determine whether by closer spacing satisfactory yields can be obtained with vernalized seed. The study of the vernalization response of all the available Indian strains in the collection at New Delhi is also in progress.

1243. REICHERT, I. 633.11-2.451.3-1.521.6(56.9)
**On the disease resistance of wild emmer.**
Palest. J. Bot. 1944 : R. Ser. **4** : 179–83.
Varieties of wild emmer, *T. dicoccoides*, showed susceptibility to covered smut. It is suggested that such a result, which is not in agreement with the results of other workers, is due to the limited nature of the experimental material, or to the possibility of particular virulence among Palestinian races.

1244. PUGSLEY, A. T. 633.11-2.451.3-1.521.6:575.12(94)
**Breeding for bunt resistance in Australian wheats.**
J. Aust. Inst. Agric. Sci. 1945 : **11** : 28–34.
A number of Australian and American wheats have been tested for reaction to a mixed inoculum of races of *Tilletia laevis* and *T. Tritici*. No Australian varieties were found to be superior in resistance to Florence. Many American varieties, however, showed resistance.
A description is given of a breeding programme which aims at imparting bunt resistance to commercial Australian wheats by back-crossing. The variety Oro has been chosen as the main parent, since it has proved to be susceptible to only one race, L.8, and highly resistant to the Australian races so far tested. The following $F_3$ lines homozygous for resistance to the local race

L.1 have been obtained: (Bencubbin x Oro) x Bencubbin, (Ranee x Oro) x Ranee and (Rapier x Oro) x Rapier. White Federation 38 and Selection 1403 are white-grained wheats resistant to L.1, but susceptibility to certain Australian races limits their use. A number of $F_3$ lines homozygous for resistance to L.1 have, however, been obtained involving these two varieties. Preliminary tests have revealed that the tetraploid wheat Doubbi possesses a major gene for bunt resistance.

## OATS 633.13

1245. THOMAS, I. and MILLINGTON, A. J. 633.13(94.1)
**Oat variety trials in the wheatbelt in 1944.**
J. Agric. W. Aust. 1944 : **21** : 365–71.
Descriptions are given of varieties recommended for the West Australian wheat belt.

1246. ZACKS, M. B. 633.13:581.056(71.3)
**Oats and climate in southern Ontario.**
Canad. J. Res. 1945 : **23** : Sect. C : 45–75.
An investigation has been made of the effect of monthly rainfalls and temperatures during the growing season upon yields. Suggestions are made for the development of varieties better adapted to environmental conditions.

## MAIZE 633.15

1247. KOCH, L. W. and MURWIN, H. F. 633.15:575.125(71.3)
**The hybrid corn industry in Ontario : pathological and other problems.**
Emp. J. Exp. Agric. 1945 : **13** : 100–11.
The development of hybrid maize in Ontario is described. An outline is given of the present breeding programme; comprehensive studies of various diseases have been made, as an essential step in the production of disease resistant hybrids. A list is included of both introduced and recently developed hybrids best adapted to the different regions of Ontario.

1248. NEAL, N. P. 633.15:575.125(77.6)
**Hybrid corn and its contribution to American agriculture.**
Annu. Mtg Ont. Crop Improv. Ass., Toronto 1945 : February 5, 6 and 7th. Pp. 9. (Mimeographed).
An outline is given of the hybrid maize breeding programme of Wisconsin.

## BARLEY 633.16

1249. 633.16:581.6(42)
BROWN, B. M. 633.79:581.6(42)
**Report on the fermentation industries for 1944.**
Soc. Chem. Ind. & Inst. Brew. 1944 : Pp. 19.
Recent work in the breeding and testing of varieties of barley and hops is reviewed.

1250. ANDERSON, J. A. 633.16:581.6(71)
**Factors related to the protein content of malting barley.**
Wallerstein Laboratories Communications 1944 : **7** : 179–91.
The relations between the protein content and other properties of barley and malt are discussed, with reference to the literature. Data of protein content are only reliable as a basis of estimating other contents when applied within a variety. A discussion is given of the value in selection work of data on protein content.

1251. ANDERSON, J. A. 633.16:581.6(71)
**Canadian research on malting barley.**
Wallerstein Laboratories Communications 1945 : **8** : 5–22.
Research in Canada on malting barley has dealt mainly with varietal differences in malting quality and methods of estimating quality. An evaluation of the malting test has been made by investigating its precision, the differential effect of malting methods upon varieties, and the differential effect of environment upon varieties. The latter is the limiting factor in comparative studies of malting quality. Studies of different varieties have established O.A.C. 21 as the standard variety. O.A.C. 21 has a high extractable content and is superior in enzymatic activity.

Olli appears to be even better in certain respects, except for its low yield of plump kernels and the fact that it is largely confined to northern Alberta; it is however considered as a useful variety in the breeding programme because of its high enzymatic activity.
Examination has been made of the relations between various barley and malt properties, which has resulted in the use of rapid prediction tests in selection work, based upon barley analyses. Both between and within varieties, malt extract has been found to be more closely related to barley extract than to any other property; the relationship between malt extract and the barley starch content is almost as close.
A bibliographical list of 43 references is included.

## RICE 633.18

1252. VENKITASUBBA IYER, C. S. 633.18:575(54.8)
**What's doing in All-India. Cochin.**
Indian Fmg 1945 : **6** : 184–86.

A recently developed type of paddy rice, Cochin I, is described. It is 15% more productive than the local varieties used for the second crop. It matures earlier, and is free from lodging.

1253. VAIDYA, V. G. 633.18:575.42:575.12(54)
**Improvement in the yield of paddy.**
Indian Fmg 1944 : **5** : 449–53.

The results of research carried out in the Central Provinces during the period 1923–1943 are briefly described. Several improved strains have been obtained, of which Luchai, Gurmatia and Surmatia have been the most successful. Three high yielding purple-leaved hybrids and three hybrids with dark purple auricles have been produced. These hybrids are particularly valuable in the eradication of karga or wild rice, the purple leaves and stems or auricles enabling the cultivator to distinguish between weed and cultivated rice.

1254. NANDI, H. K. 633.18:575.42:575.12(54.1)
**Rice in Assam.**
Indian Fmg 1944 : **5** : 505–08.

A description is given of the various classes of rice grown in Assam, and the improvement obtained by the introduction of improved varieties, by pure line selection from local varieties and by hybridization. A considerable number of promising hybrid strains are under test. Two of these hybrid types, Andrew Sail and Kerr Sail, have given an increased yield of 20–25% over the best local varieties.

## FORAGE GRASSES 633.2

1255. EDWARDS, D. C. 633.282:575.12(72.92)
**A new fodder crop: Perennial Kavirondo sorghum.**
J. Jamaica Agric. Soc. 1944 : **48** : 286–91.

Perennial Kavirondo sorghum has originated, it is believed, from natural crossing between a native grain sorghum and *S. verticilliflorum* Stapf. Trials have indicated that the variety gives a heavier yield than most introduced varieties, and shows considerably more disease resistance. In the drier mixed farming regions of East Africa the crop offers the possibility of combined use as fodder for storage and as a temporary grazing crop.
An indication is given of the scope of future selection.

## LEGUMINOUS FORAGE PLANTS 633.3

1256. 633.321–1.531.12(42)
**Red clover (*Trifolium pratense*).**
Tech. Leafl. Res. Adv. Dep., Miln and Co., Chester No. 4 : Pp. 8.

A table is given of the chief characteristics of the late flowering and broad-leaved types grown in the British Isles, including a list of typical indigenous strains and imported strains. Indigenous strains at present available are said to be generally superior to the imported strains. The various aspects of seed production are discussed.

1257. EARDLEY, C. M. 633.37(94.2)
**Tree legumes for fodder.**
J. Agric. S. Aust. 1945 : **48** : 342–45.

Descriptions are given of three leguminous trees whose pods or beans can be used for fodder; the carob bean (*Ceratonia Siliqua*), the mesquite or algaroba (*Prosopis juliflora*), and the honey locust (*Gleditschia triacanthos*).

## ROOTS AND TUBERS 633.4

1258. NANDI, H. K. 633.491:575(54.1)
**Potato in Assam.**
Indian Fmg 1944 : **5** : 551–54.

This article includes a description of the imported and local varieties cultivated and of the work of improvement carried out since 1909. An outline of the future breeding programme is given.

1259. RHODES, W. E. and
DAVIES, A. F. 633.491:581.6(42)
**The selection and pre-processing of potatoes for canning with special reference to control of texture by calcium chloride.**
Chem. Ind. Lond. 1945 : No. 21 : 162–63.

The varieties Sharpe's Express, Ninetyfold, Arran Pilot, King Edward VII, Red Skin and Majestic have shown satisfactory resistance to breakdown upon canning.

1260. BURTON, W. G. 633.491:582:578.088(42)
**Anther and petal colour of potato varieties.**
Nature, Lond. 1945 : **155** : p. 733.

Details are given of the anther and petal colours of 21 potato varieties, there having been some discrepancies in the literature relating to these characteristics.

1261. HUTTON, E. M. and
BALD, J. G. 633.491–2.8–1.521.6:575.12(94)
**The relationship between necrosis and resistance to virus Y in the potato.**
J. Coun. Sci. Industr. Res. Aust. 1945 : **18** : 48–52.

In an attempt to breed hybrid potatoes resistant to virus Y, the development of a necrotic reaction to the condition of hypersensitivity is believed to be more promising than breeding for immunity. Hypersensitive seedlings were selected from the crosses Snowflake x Katahdin and Brown's River x Katahdin. This condition and two other distinct types of necrotic reaction regarded as promising as a basis for protection against virus Y were observed to be heritable.

## FIBRES 633.5

1262. 633.51:575(42)
575:633(42)
**Progress reports from experiment stations. Season 1943–1944. Programmes of experiments. Season 1944–1945.**
Emp. Cott. Gr. Corp. Lond. 1945 : Pp. 176.

*Wells, W. G.* — *Queensland. A general review of the cotton-breeding work.* (*pp. 9–12*).
*Cotton Research Station, Biloela. Progress Report for 1943–44 season.* (*pp. 12–22*).

Greater uniformity and slight improvement in general fibre quality have been obtained in mass-selected stocks of Miller and New Mexico Acala. Newer strains of Miller possess an improved lint percentage. The highly jassid-resistant Miller strain III–26 has shown good yielding capacity, and is to be released for commercial production.

A report is given of a trial of advanced jassid hybrid strains, jassid resistant Miller strains, and commercial stocks of Miller and New Mexico Acala. In many characters the jassid resistant strains were as uniform as the commercial stocks.

Selection and the use of large-bolled strains as the recurrent parent have resulted in the elimination of the small-boll type of U.4. Flowering rate in the hybrids approaches that of the prolific U.4 parent; marked differences, however, were observed in shedding of the flowers, and some strains producing a large number of flowers did not yield as well as other less profusely flowering strains. Four hybrid strains significantly out-yielded three of the commercial stocks.

Under conditions of a light attack of jassid, Rhodesian strains, a strain of Ferguson, and the $F_1$ hybrids between these strains and commercial varieties, showed complete immunity, whereas the commercial parents exhibited slight to moderate symptoms.

*MacDonald, D., Ruston, D. F. and King, H. E.* — *South Africa. Cotton Experiment Station, Barberton. Progress Report for the season 1943–44.* (*pp. 25–31*). *Programme of work for 1944–45.* (*p. 32*). *Progress Report—Part II.* (*pp. 32–36*).

A report is given of the trial carried out to compare the yields of 30 hybrid strains from the cross U.4 x Cambodia and two hybrid strains from the cross U.4 x M.U.8 with those of the five best U.4 strains.

Breeding work within the type U.4 has been discontinued. The main object of the breeding programme is the production of a cotton completely suited to short season conditions, highly resistant to jassid, and yielding a lint of higher spinning quality than can be obtained from U.4 strains. The results of the following crosses are described: U.4, 5143 x Cambodia, U.4, 8161 x M.U.8, U.4 x Coker Wild's, M.U.8 x Coker Wild's, crosses of U.4 and M.U.8 with B.P.52, Meade, Tidewater and Gen. 33 (Harland strain), U.4, 8161 x Sea Island, and U.4, 8161 x Egyptian. The progenies of the interspecific crosses, as was to be expected, show wide variation in hairiness, lint and general agronomic characters, but contain promising material.

In a study of the $F_2$ of a cross between Sea Island, which is non-hairy and has a fine long lint, and M.U.8, which is very hairy with a rough short lint, no correlation was found between either density, length of leaf hairs or hairiness of stem, or between lint length and "fineness".

Work was continued on the study of the relationship between hairiness of leaf laminae and jassid resistance. The material consisted of *G. hirsutum* strains and crosses between *G. hirsutum* and *G. barbadense.*

*Lochrie, J. V.* — *Swaziland. Introductory note and progress reports for the season 1943–44, for the Cotton Experiment Stations.* (*pp. 37–48*).

Trials of strains in collaboration with the Barberton Experiment Station were carried out.

*Cameron. G. S.* — *Southern Rhodesia. Cotton Breeding Station, Gatooma. Progress Report for the season 1943–44.* (*pp. 49–57*).

The new strain 9L34 has been released for commercial cultivation. It is considered to be a better type of plant for harvesting than 9L18, and it has better lint qualities. Whether 9L34 will give higher yields is not yet certain. Cottons derived from crosses made at Gatooma in 1937 are heavy yielding, but their lint is coarser and shorter than those of the series 9L34. Their growth is rank and coarse, but it is suggested that too much attention has been paid to selecting small, hardy, and prolific plants.

*Anson, R. R., Knight, R. L. and Evelyn, S. H.* — *Anglo-Egyptian Sudan. Progress Report of the Plant Breeding Stations, season 1943–1944.* (*pp. 58–87*).

Work on Egyptian types has included the following:—

Tests of the black-arm resistant strain BAR. 1730L, carrying the $B_2$ gene for resistance derived from American Upland, indicate that it is similar to the commercial X1730A, but out-yields it wherever black-arm is present. This strain will be increased in the Gezira during the coming season. Selection within the black-arm resistant strains X1730 and N.T.2, which carry gene $B_2$, was continued. Second back-cross seed has been produced in the work of transferring the genes for black-arm resistance, $B_1$, $B_2$ and $B_3$, from N.T.2 back-cross types to Domains Sakel.

Resistance or immunity to black-arm is to be imparted to Egyptian types by crossing with *G. sanguineum* (*G. arboreum* var. *neglectum* f. *bengalensis* H. and G) and repeatedly back-crossing to the Egyptian parent.

Selection for early maturity is in progress in Domains Sakel and the black-arm resistant varieties X1730 and N.T.2. Simultaneously the improvement of the staple uniformity and quality of these three strains is receiving attention.

Selection for resistance to leaf curl in Domains Sakel and Massey's Selected Domains Sakel is proving effective.

In breeding for jassid resistance, the work of transferring the Tangüis gene *H*, controlling hairiness, to Domains Sakel, X1730 and N.T.2 was continued; in the varieties X1730 and N.T.2, black-arm resistant strains are being used since the lint of the resistant types proved to be satisfactory.

*G. armourianum* has shown marked resistance to bollworm. The $F_1$ of the cross *G. armourianum* x Sakel is sterile, but a form presumed to be hexaploid has been obtained which sets fertile seed;

it is proposed to designate this hexaploid as *G. "armadense"*, and use it in back-crosses to Sakel. The gene for red flowers and leaves has been transferred to the black-arm resistant X1730 and N.T.2 types from Harland's RU.4, as a means of marking these strains and facilitating the maintenance of pure stock.

American cotton is now grown as a commercial crop in only three areas, the district of the Nuba Mountains in Kordofan, the Maridi-Yambio area of Equatoria, and at Zeidab in the Northern Province. Work on American cotton has included the following:—

After several years' testing, five new varieties are available for growing in the district of the Nuba Mountains: N.T.205/41, Deltapine, N.T.96/40, N.T.58/39 and S.P.84 (Rest.). The variety N.T.205/41, selected from Uganda S.P.20, shows most promise. It is very early, has lint quality almost equal to that of Pump Scheme and a higher yield and ginning out-turn; it shows resistance to black-arm and jassids. A selection from Deltapine, a recent importation from America, has consistently out-yielded Pump Scheme; it has the disadvantages of low lint quality and susceptibility to jassids, and the desirable characters of earliness, high seed weight and very high ginning out-turn. The gene $B_2$ for black-arm resistance has been transferred to Deltapine from N.T.61/38; second back-cross material homozygous for resistance is available for trial next season. N.T.96/40, a selection from the hybrid 57 x Over-the-Top, has out-yielded Pump Scheme in all tests. It is a large-bolled, vigorous type, fairly early, and jassid resistant; the lint is better in quality than that of Pump Scheme. This new variety is heterozygous for black-arm resistance; it is hoped to obtain some pure breeding resistant material next season. N.T.58/39, a selection from a Punjab Early outcross, is large-bolled, early, fairly resistant to jassids and heterozygous for resistance to black-arm. In yield, N.T.58/39 is equal to Pump Scheme; usually it spins better and has a higher ginning out-turn. S.P.84 (Rest.), a black-arm resistant selection from S.P.84R, has produced a higher yield and ginning out-turn than Pump Scheme but is slightly inferior in lint quality; it is early and jassid resistant.

The work of transferring the additional factor for black-arm resistance, $B_3$, from *G. punctatum* to S.U.S.7/2 was continued; fourth back-cross progenies have been obtained. This material will be combined with S.P.84 (Rest.) and BAR 7/3 to produce highly black-arm resistant varieties. In Equatoria, a programme for transferring black-arm resistance to the types 511D, X.A.129 B.P.52, is in progress.

An investigation has been begun to study the possibility of imparting something of the high ginning out-turn of Deltapine to X.A.129 without adverse effect upon the high quality of the lint of X.A.129.

*Jameson, J. D. and Weatherley, P. E.* — *Uganda. Cotton Experiment Stations, Kawanda and Serere, Progress Reports for the season 1943–44. (pp. 88–101).*

In the Kawanda zone, it has been found that the local type of green fuzz is determined by a single dominant gene. The inheritance of naked and fuzzy tip proved to be complex; no conclusions were reached, apart from evidence that there were different types of dominance, giving opposite effects.

The work of transferring black-arm resistance from B.181 to B.P.52 and from Gambia Native to B.P.52 is at the fourth and third back-cross stage respectively. Transference of the gene for black-arm resistance, $B_3$, from Gambia Native to the most highly resistant strain of B.181, in order to concentrate all the available genes in one strain, reached the third back-cross.

The genetics of resistance to *Verticillium* wilt is under investigation.

From a study of the back-cross from Bukalasa Red to B.P.50 it has been found that a single dominant factor determines the character of red plant body.

In 10 district trials, B.C. 5/14 ($F_6$ seed of a selection from the first back-cross B.P.52 to B.181) and X. 3/38 ($F_5$ seed of a mixture of three parts of B.P.52 and one part of B.181) both gave yields equal to B.P.52.

In the Serere area, 328 genotypes resistant to black-arm, representing 56 strains, were isolated with the final aim of producing lines homozygous for at least one gene controlling resistance. Resistant selections have been obtained from the $F_2$ generation of the hybrid between B.P.52 and the black-arm resistant variety N.17.

The extent of natural cross-pollination has been investigated. The rate of cross-pollination was 30%.

*Peat, J. E.*, *Prentice, A. N.*, *Beggington, A. G. and McKinstry, A. H.* — *Tanganyika Territory. Ukiriguru Experiment Station. Progress Report for the season 1943–44.* (*pp. 102–09*). *Lubaga Experiment Station, Shinyanga. Progress report for the season 1943–44.* (*pp. 110–18*). *Eastern Province. Progress Report for 1943.* (*pp. 124–35*).

At Ukiriguru, trials with selected material have indicated the possibility that a strain suitable for replacing Mz. 561 has been obtained. Selection of strains from Ukiriguru and Lubaga is to be continued.

At Lubaga, stocks of Uganda Upland have provided a greater proportion of promising selections than stocks of U.4 and U.4 x Cambodia. Mz. Local, Mz. 561 and Mz. 457 have given the majority of the promising selections.

Work in the Eastern Province is mainly confined to the testing of different varieties and strains. A variety trial indicated that types with higher flowering rates give better yields than Eastern Province Local.

*Ducker, H. C.*, *Miller, W. L.*, *Pearson, E. O. and Mitchell, B. L.* — *Nyasaland, Cotton Experiment Stations. Domira Bay Station, Progress Report, 1943–44. Entomological work, Progress Report, 1943–44.* (*pp. 138–53*).

High yielding selections with a better type of lint than C.L.U.4 have been derived from Mz. 561. The family C.L.20, selected from C.L.U.4, shows promise. Selections from the cross Malwa Upland x U.4, made at Barberton, Transvaal, have exhibited a high degree of jassid resistance.

*Bond, W. E.* — *Nigeria. Progress Report on cotton growing in the Northern Provinces for the season 1943–44.* (*pp. 154–62*).

In the Northern Provinces, native cotton (*G. peruvianum*) from Sokoto has shown marked resistance to leaf curl. E31, a selection from Allen American Upland, is very hairy and is being mentioned for possible use in breeding work for jassid resistance, although it is itself useless since it has a number of dead seeds in each boll.

In the Southern Provinces, an experiment indicated that the suspected loss of vigour in Ishan A in recent years may not be attributable to continuous self-fertilization. The rough linted cotton selected from native farms in the Ishan districts has proved too susceptible to insect attack for further work, and has been found inferior to Ishan A.

*Hutchinson, J. B. and Manning, H. L.* — *West Indies. The agricultural problems of the West Indian cotton industry. Cotton Experiment Station, St. Vincent. Progress report for the season 1943–44 and programme of experiments for the season 1944–45.* (*pp. 163–76*).

The programme to improve the agronomic qualities of superfine V.135 by hybridization with Montserrat Sea Island was begun in 1930. It is reported that the quality of some of the strains produced, which are known as VH, is now within the range of variation of V.135. The results of the work of the last six years indicate that the yield of the material is also considerably higher than that of V.46, the race of V.135 now in commercial cultivation. The introduction of the technique of the replicated progeny row followed by balanced incomplete block designs, and, during the past season, a lattice square, has made possible the critical analysis of yield with relatively high precision. After 13 years of self-fertilization and progeny row selection, the variability within and between groups is sufficient to be satisfactorily detected by the experimental designs developed. The statistical evidence now available indicates that distinctive genotypes have been isolated, and reveals the optimum course of selection; thus in VH.8, the number of bolls per plant is shown to be of great importance, while in VH.10 most progress in selection can probably be made in favour of lint yield per seed.

In addition to the VH material, inter-strain VH hybrids and hybrids between Red Sea Island and VH strains offer wide scope for selection.

A study was made of the effect of self-fertilization upon yield in certain varieties. No marked varietal differences in behaviour were observed, except in the case of the variety Sea Island White. All varieties, however, gave lower yields when selfed than when unselfed, and showed a consistent reduction in ginning out-turn when selfed.

Further investigation has been made of differential varietal response to fertilizer treatment.

1263. Thomas, R. 633.51:575(54.7)
**American cotton growing in Sind.**
Indian Fmg 1944 : **5** : 557–59.

A brief history is given of various attempts to grow long staple cotton in Sind. The selection work carried out in Punjab American cottons is described. The selection from 289 F, known as Sind Sudhar, has an important place. Recently the new Sind American variety M4 has shown considerable promise. Hybridization work begun in 1940 is described. Some of the hybrid progenies obtained are promising as regards yield, vegetative characteristics, earliness, staple length and ginning percentage.

1264. Hutchinson, J. B. and
Manning, H. L. 633.51:576.16:575.42:575.12(72.98)
**The Sea Island cottons.**
Emp. J. Exp. Agric. 1945 : **13** : 80–92.

A detailed history is given of the Sea Island cottons, nearly all the existing types of which have been brought together at the St Vincent Experiment Station, British West Indies. The different existing strains are grouped under the following varieties: St Vincent Rivers, Superfine V46 (known commercially as V135), MSI, Puerto Rico Regular, Westberry-Sind and White Flower. Descriptions are given of the varieties and their component strains, including an account of their breeding.

The necessity of a controlled seed supply to maintain uniformity is emphasized. The few mutant types that occur in pedigree stock are described.

Highly variable material suitable for further selection is available in the commercial crop of Puerto Rico Regular, but no longer exists in any other West Indian or American stocks. Variability for breeding purposes must therefore be obtained by hybridization. Intervarietal crosses involving the three important West Indian varieties, Superfine V46, MSI and St Vincent Rivers, are likely to produce promising strains. Extensive study of the cross V46 x MSI in St Vincent is reported. Superfine strains known as VH have been secured, with various combinations of boll size and habit characters.

1265. 633.51–2–1.521.6:575(42)
**Report of the Administrative Council of the Corporation submitted to the Twenty-Fourth Annual General Meeting on June 5th, 1945.**
Rep. Emp. Cott. Gr. Corp. 1943–1944 (1945) : Pp. 18.

A survey is given of work in progress in Africa and the West Indies.

Ishen A, the chief variety in Southern Nigeria, is annually re-selected with the object of increasing yield.

Selection work at Domira, Nyasaland, aims at combining jassid resistance, satisfactory yield and lint quality. Hybridization work at Barberton, Transvaal, carried out with the aim of combining jassid resistance and satisfactory yield and quality, includes the crossing of U.4 with Cambodia and other types.

In the Anglo-Egyptian Sudan, the main objectives of breeding work with Egyptian types are the introduction of resistance to black-arm into the chief commercial varieties, the selection of early maturing types, and the improvement of yield, staple uniformity and quality. Progress in the first objective is reported. Promising results have been obtained by crossing commercial types with a resistant American Upland variety from Uganda and repeatedly back-crossing to the Egyptian parent. Breeding work on a derivative of X.1730 which retains the characters of its Sakel parent, and is highly resistant to black-arm, is almost complete. Hybridization work is also in progress to impart resistance to a selection of Domains Sakel.

The possibility of breeding *Lygus*-resistant varieties is under consideration in Uganda.

Large scale spinning tests of samples from different regions are reported.

1266. Lal, K. B. and
Afzal Husain, M. 633.51–2.7–1.521.6:581.49(54)
**Hairiness of cotton leaves and anti-jassid resistance.**
Curr. Sci. 1945 : **14** : 153–54.

The resistance of hairy-leaved varieties to jassid attack is said to be due not to the inability of the insect to feed on hairy leaves but to its inability to oviposit. The character of jassid resistance should therefore be sought in the leaf veins, the site of oviposition. A more critical approach to the use of hairiness as an indicator of jassid resistance is advocated.

1267. Ghose, R. L. M. and Datta, J. 633.523:575.242:576.312.35
**A note on leaf mutations in jute.**
Sci. and Cult. 1945 : **10** : 297–98.
Two jute mutants, $V_2$ and $V_3$ are described. The former is characterized by leaves with incomplete laminae, and small deformed flowers which produced no seeds; the chromosome number is normal ($2n = 14$). The latter is distinguished by its narrow deeply serrate leaves and is a trisomic ($2n + 1 = 15$).

## SUGAR PLANTS 633.6

1268. Dodds, H. H. 633.61:575
**Further developments of sugarcane varieties in South Africa.**
Proc. 18th Annu. Congr. S. Afr. Sug. Tech. Ass. 1944 : 38–43.
One new variety, Co. 331, a cross between Co. 213 and Co. 214, has been released for commercial planting. Co. 331 may be expected to give increased yields of sucrose per acre in comparison with other varieties only in very light soils, where its superiority in yield of cane is sufficient to overcome its relatively low sucrose content.
The gradual establishment of new canes from imported seed of varied origin and comparative experiments with them are described, and the descent of such seedlings from original natural varieties is shown diagrammatically.

1269. 633.61:575.42(54)
**What the scientists are doing. The 1945 batch of Co. canes.**
Indian Fmg 1945 : **6** : p. 176.
A description is given of Co. canes for 1945, i.e. Co. 623 to Co. 633, inclusive. The selected canes include thickish and medium thick canes. Several are early ripening types with satisfactory sucrose content. Three non-flowering canes are included. Particular attention is drawn to Co. 626 which gives promise of combining satisfactory yield and sucrose content. Co. 626 is a seedling from the cross P.O.J. 2878 x *Sorghum Durra* Stapf.

1270. Hull, R. and Watson, M. A. 633.63–2.8–1.521.6(42.54)
**Virus yellow of sugar beet.**
J. Minist. Agric. 1945 : **52** : 66–70.
Mention is made of experiments to test the reaction of many varieties to infection with virus yellows. No variety has proved consistently superior in resistance, but small differences in susceptibility have been found which suggest the possibility of breeding resistant varieties.

1271. Senaratna, J. E. 633.682:577.83
**Bisexual flowers in the manioc, *Manihot esculenta* Crantz (*M. utilissima* Pohl).**
Ceylon J. Sci. 1945 : **12** : Sect. A : p. 169.
A plant of the variety AB 12 (MU 11) is described which bears some hermaphrodite flowers.

1272. Joachim, A. W. R. and Panditesekere, D. G. 633.682:581.192(54.8)
**Investigations of the hydrocyanic acid content of manioc (*Manihot utilissima*).**
Trop. Agriculturist 1944 : **100** : 150–63.
A combination of the auto-enzyme and acid hydrolysis methods has been found satisfactory for estimating hydrocyanic acid content. Investigation of several varieties indicates that the chief factors determining hydrocyanic acid content are variety and environmental conditions.

## STIMULANTS 633.7

1273. Pal, B. P., Ramanujam, S. and Narayana Rao, T. 633.71:575(54)
**An improved variety of flue-cured tobacco.**
Indian Fmg 1945 : **6** : 154–55.
Amarelo 5 is a new variety of flue-cured tobacco, selected from Amarelo at Guntur, Madras. It is earlier maturing than Harrison's Special, and produces 20% more leaf in the high priced grades.

The ripening of its leaf in the field is characteristic, thus facilitating correct harvesting, and in curing, the "yellowing" stage is reached more quickly than in other varieties. Amarelo 5 has shown a wide adaptability, and it grows well on heavy soils.

1274. HASLAM, R. J. 633.71:575.42(71.3)
**Harrow Resistant Broadleaf Burley.**
Lighter, Ottawa 1945 : **15** : p. 14. (Mimeographed).
A valuable selection, Harrow Resistant Broadleaf, has been obtained from Johnson's Broadleaf Resistant Burley. This new variety is more resistant to black root rot than the parent variety. It may not prove as high yielding as the original variety, but it has a more compact leaf for the purpose of wrapping, and cures uniformly.

1275. SATHER, J. D. and HILL, D. D. 633.79:519.271.3(79.5)
**Some problems in measuring certain hop qualities.**
Wallerstein Laboratories Communications 1944 : **7** : 87–100.
An attempt has been made at the Oregon Horticultural Experiment Station to ascertain the various factors determining quality in hops and to develop accurate methods of measurement. Considerable variation was found in the stem and leaf content of a lot. The seed content was uniform in most lots but variable in some. Tenth bale sampling is adequate in lots which are reasonably uniform or contain a large number of bales; where the lot is small and varies widely in given qualities the occasional sampling of every fifth bale is necessary. It is pointed out that many factors other than stem and leaf content and seed content affect the quantity of resins. Total resin content tended to be lower in classes high in leaf and stem content.

1276. NOTT, J. 633.79:575(42.47)
**Trial of new varieties of hops—1944 season. Final report.**
Worcs. Agric. Quart. Chron. 1945 : **13** : 115, 117.
A report is given of the trial of thirteen new varieties developed at Wye.

## CONDIMENTS 633.84

1277. SINGH, M. P. and ROY, R. S. 633.842:581.47:575.11.061.1
**Inheritance of fruit position in a chillie cross.**
Curr. Sci. 1945 : **14** : p. 133.
In crosses between the pure strains I.P. 34 and "Yellow Wax", the pendant position of fruit was found to be dominant to erect and determined by a single factor.

## OIL PLANTS 633.85

1278. RASUL, C. K. 633.853.49:575.42(54.5)
**What's doing in All-India. Punjab.**
Indian Fmg 1945 : **6** : 180–81.
Raya L.16 has again shown superiority to toria Raya L.23 as a rabi crop has given high yields even on salt infested soils, where other crops such as toria and gram fail to grow satisfactorily. An investigation has been made of the rate of degeneration of yielding capacity in toria when mass selection is discontinued. Deterioration was shown in the crop in which mass selection had not been practised for three years. Keeping honey bees in the toria fields resulted in increased yields.

1279. 633.853.49:575.42:575.12(54.5)
**What the scientists are doing. Improvement of *toria* in the Punjab.**
Indian Fmg 1944 : **5** : 523–24.
An improved strain of toria, designated selection A, has been produced by mass selection. This selection gives a higher yield of seed than the local strains and has a higher oil content. It is free from admixture with seeds of allied *Brassica* crops and is fairly uniform in maturity. Mention is made of recent research work which has revealed the possibility of obtaining self-fertile types of toria by crossing this crop with self-fertile forms of sarson.

1280. Raghavan, T. S. and
Krishnamurthy, K. V. 633.853.74:576.312.35:575.127.2(54)
**Chromosome number of *Sesamum laciniatum*, Klein.**
Curr. Sci. 1945 : **14** : 152–53.
A brief preliminary account is given of cytogenetical investigations of the genus *Sesamum* and the work of producing the hybrids *S. orientale* x *S. prostratum*, *S. laciniatum* x *S. orientale* and *S. laciniatum* x *S. prostratum* in progress at Annamalai University. The chromosome number of *S. laciniatum* has been found to be $2n = 28$.

1281. Hosszu, M. de. 633.854.54(42)
**Linseed.**
N.F.U. Rec. 1945 : **23** : p. 157.
A brief description is given of several varieties.

1282. Murray, D. B. 633.855.34:575(66.9)
**The Oil Palm Research Station of Nigeria.**
Trop. Agriculture, Trin. 1945 : **22** : 93–96.
A brief account is given of the agricultural experiments and breeding work in progress at the Oil Palm Research Station, Nigeria.

## MEDICINAL PLANTS 633.88

1283. Moreau, R. E. 633.885.1:016
**An annotated bibliography of cinchona-growing from 1883-1943.**
East Afr. Agric. Res. Inst., Amani 1945 : Pp. 41.
This bibliography makes additions to that recently prepared by the Science Library, London.

## FRUITS 634

1284. Black, M. W. 634:575(68)
**Uneconomical deciduous fruit varieties.**
Fmg S. Afr. 1943 : **18** : 382–87.
The indiscriminate use of imported varieties that are not adapted to the climatic conditions of South Africa is held to be the chief cause of the unsatisfactory average production. A brief description is given of selection and breeding work in progress.

1285. 634.1:581.331:581.036(42)
Modlibowska, I. 634.1:581.162.5:575(42)
**Pollen tube growth and embryo-sac development in apples and pears.**
J. Pomol. 1945 : **21** : 57–89.
A general survey is presented of the causes of incompatibility and the factors affecting fruit setting in apples and pears. A detailed investigation has been made of pollen tube growth and the development of the embryo-sac at different temperatures in self-pollinations of diploids and triploids of apple and pear and of a tetraploid pear, and in various cross-pollinations, viz. diploid x diploid, diploid x triploid, triploid x diploid in apple and pear, triploid x triploid in apple, and tetraploid x diploid in pear.
In both apple and pear three well-defined types of pollen tube can be distinguished, viz. incompatible, semi-compatible and compatible. Incompatible pollen tubes develop slowly and growth is inhibited at an earlier stage at a temperature of 25°–30° C. than at a lower temperature of 10°–20° C.; at 25°–30° C. they are completely arrested in the upper part of the style and a high proportion develop swollen ends. Semi-compatible tubes grow slowly but continue to grow at all temperatures and reach the ovary but seldom effect fertilization. The rate of growth of compatible tubes at temperatures of 10°–15° C. is similar to that of the incompatible and semi-compatible types but shows more acceleration with rise of temperature. High temperature therefore speeds up the reaction of incompatibility, resulting in an early inhibition of growth. The rate of growth of compatible tubes on the other hand is accelerated by rise of temperature.
In self-pollinated diploid apples both incompatible and semi-compatible tubes occur, while in pears only incompatible tubes were observed. This result is in basic agreement with the sharply defined incompatibility of pears in contrast to the gradation of this condition in apples, and with the more sharply defined segregation of morphological characters occurring in pears. Self-incompatibility in triploid apples and pears is less strongly expressed than in the diploids; in all triploids both incompatible and compatible tubes were present. Thus, in spite of gametic

sterility, selfed triploids usually give a higher percentage of fruit setting than selfed diploids. In the selfed tetraploid pears, derived somatically from a self-incompatible diploid variety, both incompatible and a high proportion of compatible tubes were observed. This result supports the view that polyploidy can cause the breakdown of self-incompatibility, the hypothesis being that incompatible tubes carry two of the same *S* allelomorphs while compatible tubes carry two different *S* allelomorphs.

Most cross-pollinations between diploids are compatible, but some incompatible pollinations occur in both apples and pears. Some of the cross-pollinations are only partially compatible, both compatible and incompatible tubes being present in the styles. In the triploid x diploid pollinations, both compatible and incompatible combinations occur. Incompatibility is relatively more frequent than in the group of diploid x diploid pollinations; the chance of the incompatibility genes of the pollen meeting similar genes in the style is increased with the rise in chromosome number of the female parent.

No completely incompatible pollinations were found in the diploid x triploid group. The low fertility observed in this group is mainly due to the high degree of pollen sterility. The pollen tubes of triploid apples were observed to grow more slowly, on account of their greater diameter, and effected fertilization later than tubes of diploids. Results similar to those observed in the diploid x triploid group were obtained among the triploid x triploid pollinations.

In the investigation of tetraploid x diploid cross-pollination in pear, the pollen tubes of the diploid were found to be incompatible with the styles of the tetraploid.

The causes of increasing incompatibility among apple varieties in recent years are discussed. This increase is partly due to the use of bud mutations in the production of new varieties, all the diploid bud mutations so far examined being incompatible with the original variety. Furthermore, the breeding of new varieties has been limited to a few parental types, thus giving rise to closely related seedlings. An indication is given of the possibilities of breeding self-compatible varieties, which have obvious advantages, and of the best parents to select for such work.

1286. PERLBERGER, J. 634.1–2.484–1.521.6(56.9)
**The occurrence of apple and pear scab in Palestine in relation to weather conditions.**
Palest. J. Bot. 1944 : R. Ser. **4** : 157–61.

The scab diseases of apple and pear, caused by *Fusicladium dendriticum* and *F. pirinum* respectively, have so far been found only on local varieties. European varieties escape attack not by inherent resistance to the diseases, but by their type of response to weather conditions.

1287. SIMMONDS, A. 634.11:576.16(42)
**The origin of apple "Ellison's Orange".**
J. R. Hort. Soc. 1945 : **70** : 150–51.

A brief historical account is given of the dessert apple Ellison's Orange.

1288. SMITH, W. H. 634.22–1.547.6:581.04(42)
**Some observations on the ripening of plums by ethylene.**
J. Pomol. 1945 : **21** : 53–56.

An investigation has been made of the effect of acetylene upon ripening in the varieties Myrobalan, River's Early, Czar and Monarch.

1289. RAHEJA, P. C. 634.25:575.12(54.2)
**What's doing in All-India. North-west Frontier Province.**
Indian Fmg 1944 : **5** : 529–31.

Hybridization between the peach variety 6A and Red French Early is reported at the Agricultural Research Station, Tarnab, this being the first attempt to breed a new variety by crossing.

1290. HOFMEYR, J. D. J. and
ELDEN, H. VAN 634.651:576.356.5:581.04(68)
**Tetraploidy in *Carica papaya* L. induced by colchicine.**
S. Afr. J. Sci. 1942 : **38** : 181–85.

Tetraploid plants were obtained by treating seedlings of *C. Papaya* with colchicine. Increases in general vigour, size of leaves, flowers, seeds and pollen grains were observed in the tetraploids. The plants appeared to be highly fertile. The male characteristics of the tetraploid staminate tree were accentuated.

1291. Floor, J. and
Rogers, W. S. 634.75:578.088(42)
**Key for the identification of the commonly cultivated commercial varieties of strawberries.**
J. Pomol. 1945 : **21** : 34–40.

A scheme of identification, based upon various characters of the leaf and designed primarily for identifying plants in runner beds, is given for 10 commercial varieties.

1292. Le Roux, M. S. 634.835:575(68)
**Grape varieties for the local market.**
Fmg S. Afr. 1943 : **18** : 397–400.

A discussion is given of the following promising varieties, Queen of the Vineyard, Pearl of Csaba, Pirovano No. 15, Ferdinand de Lesseps and Muscat Hambro.

## FORESTRY 634.9

1293. Penfold, A. R. and
Morrison, F. R. 634.973:576.16(94)
**Commercial Eucalyptus oils.**
Bull. Tech. Educ. Branch, Technol. Mus. Sydney 1944 : No. 2 : Pp. 36.

Detailed information is given of the distribution, oil yields and various oil properties of the various species of *Eucalyptus*. The physiological forms found in certain varieties are included.

## VEGETABLES 635

1294. Holdsworth, M. 635.25:581.143.26:581.165(42)
**A comparative study of onion varieties in relation to bolting and yield when grown from sets.**
Ann. Appl. Biol. 1945 : **32** : 22–34.

A report is given of two trials, each of 25 varieties tested during two seasons and the winter storage period. Varietal differences in bolting, yield, earliness and behaviour during storage are described.
Varieties were found which bolted little and gave high yields when grown from sets, although there was some indication that a named variety from the same source may behave differently as regards bolting in different years. V38 Yellow Ebenezer and V28 Reliance are however recommended.

1295. Macpherson, N. J. 635.52:575(42.72)
**Glasshouse lettuce trials in Lancashire.**
J. Minist. Agric. 1945 : **52** : 117–20.

The trials of two new varieties, 5*a* and 5*b*, in comparison with Cheshunt Early Giant, are described. Cheshunt Early Giant gave a higher proportion of first grade heads. The varieties 5*a* and 5*b* are less bulky, with a more compact growth habit, and are a lighter green.

1296. Ling, L. and
Tai, M. C. 635.52–2.411.4:576.16:631.521.6
**On the specialization of *Bremia lactucae* on Compositae.**
Trans. Brit. Mycol. Soc. 1945 : **28** : 16–25.

Physiological specialization within the species *Bremia Lactucae* Regel is reported and an account is given of the reactions of the differential hosts. A closely related form (*B. Saussureae* Saw.) attacking *Saussurea affinis* Spreng. is regarded as specifically distinct.

1297. Khan, A. R. and
Bhatnagar, M. P. 635.654(54)
**Cowpea varieties and culture.**
Indian Fmg 1945 : **6** : 212–13.

Descriptions are given of several varieties found to be suitable for fodder and grain as a result of the study of a large number of strains at the Agricultural Substation at Karnal.

1298. AITKEN, Y. and HAUGHTON, J. M. 635.656:575(94)
**The species *Pisum sativum* in relation to Australian agriculture.**
J. Aust. Inst. Agric. Sci. 1945 : **11** : 35–40.

A breeding programme is described which has as its objective the development of varieties producing high yields of grain and hay of satisfactory nutritional value, and adapted to a wide climatic range.

1299. SUNDAR RAO, Y. 635.659:576.312.35
**Chromosomes of *Erythrina indica* Lamk.**
J. Indian Bot. 1945 : **24** : 42–44.

The course of meiosis in *E. indica* is described and figured. There are 21 haploid chromosomes.

# Part II. Foreign

## *STATISTICS 519

1300. Anderson, J. A. 519
**The role of statistics in technical papers.**
Trans. Amer. Ass. Cereal Chemists 1945 : 3 : 69–73.
The importance of statistics in the sound planning of experiments is emphasized. It is on the other hand pointed out that in most scientific papers statistics should be a means and not an end. The stricter use of statistical terms is advocated.

## BIOLOGICAL SCIENCES 57

1301. Novikoff, A. B. 57:1
**The concept of integrative levels and biology.**
Science 1945 : **101** : 209–15.
In this essay, the author urges the utilization of the concept of integrative level when discussing the nature of organisms and the relation of the whole individual to its parts. Such a notion is believed to be more adequate than a purely physico-chemical approach, while on the other hand, it is thought to avoid the implications of vitalist or teleological views.

## *BREEDING 575

1302. Dobzhansky, T. 575
**What is heredity?**
Science 1944 : **100** : p. 406.
In reply to an article by Dice, it is pointed out that it is not characters, morphological or psychological, that are inherited in the strict sense of the term, but rather norms of reaction to various environmental factors.

1303. Scheibe, A. 575:007(43)
Ludwig Kiessling†. Leben und Wirken eines Pflanzenbauers und Pflanzenzüchters im Dienste der deutschen Landwirtschaft. (**Ludwig Kiessling†. Life and activities of an agronomist and plant breeder in the service of German agriculture**).
Z. Pflanzenz. 1942 : **24** : 592–98.
This obituary notice of the late Professor Kiessling of Munich includes many references to his contributions to plant breeding. A list of his published works is appended.

1304. Heinisch, O. 575:633(43.7)
Neue Grundlagen für die Pflanzenzüchtung und das Sortenwesen im Protektorat Böhmen und Mähren. (**New bases for plant breeding and the regulation of varieties in the protectorate of Bohemia and Moravia**).
Z. Pflanzenz. 1941 : **24** : 398–408.
The history of plant breeding work in Bohemia and Moravia is outlined, and a list given of the plant breeding stations and the crops they were dealing with at the time of the German occupation. The changes in organization brought about under German rule are summarized. The new system of variety registration is described and a list given of the varieties of various crops which are permitted to be grown. S. E.

1305. Meier, K. 575:633(49.4)
Bericht der Eidgenössischen Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil für die Jahre 1941 und 1942. (**Report of the Federal Research Institute for Fruit Growing, Viticulture and Horticulture in Wädenswil for the years 1941 and 1942**).
Landw. Jb. Schweiz. 1944 : **58** : 417–95.

**Strawberry**
A new line 26/2, from Wädenswil 1 x Hansa is being tested. Efforts are being made to develop a small-fruited variety from Monatserdbeere Wädenswil ohne Ranken [Wädenswil runnerless perpetual strawberry] x *Fragaria viridis*.

---

* General studies, see also individual crops.

**Vine**
Breeding work continues.

**Onion**
Swiss varieties and the American variety Early Yellow Globe are being selected for keeping quality, earliness and uniformity.

**Cabbage**
Thurner Type III is a new variety that yields more highly than Thurner Type II and produces a high quality sauerkraut. The mountain cabbage (Bergkabis) is being selected for keeping quality, and selection is also being pursued with "Spätwirz" and red cabbage (Blaukabis).

**Bean**
Promising dwarf bean lines are being developed from Genfer Markt x Frühe Wagenaar and Genfer Markt x Konserva. The $F_4$ generation of a cross between the runner bean variety Juli and the dwarf bean Genfer Markt includes plants combining the runner bean habit with earliness and rust resistance.

1306. CONNER, A. B. 575:633(76.4)
**Agricultural research serves farmers, ranchers and industry.**
55th and 56th Rep. Tex. Agric. Exp. Sta. 1942–1943 : Pp. 45.

**Wheat**
A new variety of soft red winter wheat, resistant to stem and leaf rust, has been named Austin. It is a good grain producer and suitable for winter grazing. The Rustler oat and Tunis barley are new rust resistant varieties which are good grain producers and also winter grazing crops. Two new varieties of hard red winter wheat, Comanche and Wichita, have been developed co-operatively by the Texas, Oklahoma and Kansas stations. Comanche has been produced from a cross between Tenmarq and Oro. It is bunt resistant and superior to Tenmarq, in yield, test weight and rust resistance, and equal to Tenmarq in milling and baking qualities. Wichita has been selected from a cross between Early Blackhull and Tenmarq. It is similar to Early Blackhull in yield and test weight, but superior in milling and baking qualities. A new rust resistant variety, not yet named, has been developed from a cross between (Kanred x Hard Federation) x Tenmarq. This variety is similar to Tenmarq in general appearance and milling and baking qualities, but has an earlier maturity, and higher yield and test weight.

**Sorghum**
A strain of waxy kafir has been produced yielding 67% of the particular form of starch extractable from cassava. Four types of grain sorghum suitable for combine harvesting have been developed: Plainsman, Caprock, Bonita and Early Hegari.

**Rice**
A new variety has been developed from a cross between Rexoro and Fortuna. It has shorter straw and ripens more quickly than the variety Nira, and thus shows promise of suitability for combine harvesting. The Blue Rose strain, T.S. No. 7183, released in 1941, is considered to be superior to the commercial strain grown in its vigorous growth and yield. Texas Patna is a new long grain variety, similar to Rexoro but maturing about 15 days earlier.

**Forage grasses**
Cold-resistant strains of Rhodes grass that withstand a temperature of 6° F. have been selected from ordinary Rhodes grass; usually this grass is killed at 15° F. These strains should increase the range of adaptation of Rhodes grass in Texas. A leafy type of yellow beardgrass (*Andropogon ischaemum*), resistant to both cold and drought, has been developed from the usual type of yellow beardgrass. A sweet-stemmed Sudan grass has been obtained which is immune to some stem and leaf diseases. By suitable breeding a sienna colour has been imparted to the hull, making the strain easily recognizable.

**Leguminous forage plants**
A new forage variety of annual sweet clover, named Emerald, has been developed by crossing with Hubam clover. This variety has more numerous, finer and leafier stems than Hubam.

**Potato**
The selection Texas Porto Rico has given good yields.

**Cotton**
Differences have been observed among varieties of Upland cotton in their response to light conditions as shown by the number of mature bolls produced.
Suntex and Dentex are new high yielding varieties developed by inbreeding and selection from Sunshine Rowden. They are resistant to adverse weather conditions and well adapted to central and north central Texas. Mebane 140, Lockett 140, Western Prolific (Mebane 141) and Mebane 804–50 are new varieties giving high yields of medium fibre length. Stormproof produces high yields with good cleaning and spinning qualities, and is especially adapted to harvesting by machine.
A cytogenetic study of the taxonomic relationships of cotton species is almost complete. Four plants with an extra pair of chromosomes were obtained in 1943; this is believed to be the first occurrence of the phenomenon in cotton. Fertile hybrids between the cultivated American 26-chromosome species and the wild or cultivated 13-chromosome species, now made possible by the use of colchicine, are being investigated with a view to the utilization of the economically valuable characters carried by the 13-chromosome types.

**Flax**
The flax varieties Rio and Viking are highly resistant to rust and more resistant to cold than the standard varieties, Bison and Punjab. The early maturing variety Norsk has been found to be resistant to rust. A rust resistant, winter-hardy variety has been obtained from Turkey C.K.862.

**Essential Oil plants**
The following native plants have been found to possess commercial possibilities, *Monardia fistulosa* (horse mint), *Prunus Laurocerasus* (cherry laurel)*, *Solidago odora* (golden rod) and *Pucnanthemum incanum* (mintweed). The last named species is particularly promising, having a high pulegone content and able to replace the imported oil of pennyroyal.

**Peach**
Early white freestones of good dessert quality have been selected which are late blooming and bear well in a mild climate. These and other selections have been back-crossed to early yellow freestones to obtain commercially valuable peaches.

**Citrus fruits**
Seedlings of citrange produced by crossing the trifoliate orange and the sweet orange, and seedlings of citrumelo, produced by crossing the trifoliate orange and grapefruit, have shown segregation for leaf type and differences in cold resistance. Little difference in hardiness was found between the two types of hybrids. Deciduous trees tended to be hardier than partially evergreen.

**Dewberry**
Intervarietal hybrid selections have been obtained which are early, large-fruited and productive. The selections R 40–202 and R 40–51 are particularly promising.

**Onion**
Early Grano is a new heavy-yielding strain maturing about two weeks earlier than other strains.

**Broccoli**
An inbred selection of green-sprouting broccoli shows promise as an early type with small buds and compact heads.

**Tomato**
The variety Summerset is being improved by crossings with Bison and Stokesdale. Its fruit size has been increased and its late summer production has been maintained. In order to develop a variety of yellow tomato adapted to conditions in eastern Texas, a cross has been made between the wilt immune varieties T.550 and Pan America; $F_2$ and $F_3$ selections gave good yields of large yellow globe fruits on vigorous vines. Selections of crosses between commercial and currant-fruited types were crossed with Marglobe and Rutgers. The hybrids were selected for several generations for adaptability and resistance to *Fusarium*. Additional crosses were made between the selections obtained and Pritchard, Oxheart and T.723. Selections with large fruits of good quality were secured.

* A sixteenth century introduction.

**Cowpea**
Selections from Blackeye have been made which are resistant to nematode attack and *Fusarium* wilt.

**Pea**
Selection No. 8152 of Purplehull shows increased resistance to root-knot nematodes and resistance to *Sclerotium bataticola.*

**Insecticides**
The rotenone content of *Tephrosia virginiana* L. has been increased by selection.

1307. 575:633(76.9)

**Annual report of the Director of the Kentucky Agricultural Experiment Station for the year 1944.**
57th Ann. Rep. Ky Agric. Exp. Sta. 1944 : Pp. 68.

**Wheat**
Several new hybrids show promising resistance to leaf and stem rust. Some hybrids between hard and soft wheats combine the rust resistance of the hard wheat with the characters of soft wheat.

**Oats**
An attempt is being made to obtain hybrid selections hardier than the varieties now available.

**Maize**
With the object of obtaining hybrids with greater resistance to lodging, diseases and insects, 10 white and 17 yellow inbreds were tested in all possible single cross combinations. Several inbreds produced hybrids with high yielding capacity and other desirable characters. In order to obtain improved breeding material, a study has been made of 40 local open-pollinated varieties, and new inbreds are being developed by the pedigree method.
Observations on corn borer infestation have been made in recently developed single and double cross hybrids.

**Kentucky bluegrass**
Relatively disease resistant selections have been obtained.

**Red clover**
Top-crosses were made between vigorous, disease resistant, self-sterile plants of the Southern selection and self-fertile plants of this selection, in an attempt to develop valuable self-fertile lines.

**Hemp**
Wide differences in the narcotic property of the seeds and leaves were found in an investigation of six varieties.

**Tobacco**
Several mosaic resistant Burley varieties, including Ky 54 and Ky 55, produced by repeatedly back-crossing Ky 16 on mosaic resistant plants of successive generations, have exhibited satisfactory quality and mosaic resistance. Ky 34, a new Burley variety resistant to black root rot, *Fusarium* wilt and mosaic, has given high yields of good quality in preliminary tests, but has not shown good wind resistance. Ky 150 is a new mosaic resistant variety of dark tobacco produced by repeated back-crosses of Brown Leaf on mosaic resistant plants derived from Samsoun; it has given satisfactory results in commercial plantings. Ky 160, a new mosaic resistant one-sucker variety obtained by repeatedly back-crossing One Sucker on mosaic resistant plants derived from Samsoun, has given promising results in commercial tests.
In an analysis of the relative concentration of pigment in dark and Burley varieties, both the chlorophyll and carotene contents of varieties of dark tobacco were found to be greater than in the Burley varieties. In a given weight of tissue about half the difference in chlorophyll content was due to the thickness of leaf and half to the concentration of pigment.

**Sweet corn**
Among twelve varieties tested, none showed marked resistance to ear worm, with the possible exception of Louisiana Sweet.

1308. 575:633(77.7)
519.271.3

**Report on agricultural research for year ending June 30, 1944.**
Rep. Ia Agric. Exp. Sta. 1944 : Pt. I : Pp. 298.

**Statistics**
Various statistical researches are reported. These include the determination of the most efficient methods of estimating yields in experimental plots, the examination of climatological data, and problems of sampling in making surveys.

**Wheat**
$F_9$ lines from the cross Iobred x Minhardi gave high yields. Crosses of standard varieties and disease resistant strains are being grown in the $F_3$ generation.

**Oats**
The progress made in the breeding of superior, disease resistant varieties is reported. Cedar (C.I. 3314) is a new variety developed co-operatively by the Iowa and Nebraska Experiment Stations; it has been selected from the cross Victoria x Richland. Hybrid selections with Bond as one parent are promising in comparison with Boone, Tama and other varieties. They have a higher resistance to crown rust, halo blight and races 8 and 10 of stem rust; their yield and test weight are higher, and the straw is stiffer. Selections from D 69 x Bond are particularly promising, and the selection C.I. 3971 has been named Clinton. The $F_2$, $F_3$ and $F_4$ generation of hybrids combining resistance to the North American races of rusts and smuts and to halo blight with superior agronomic qualities have been produced. Bond and Victoria, either singly or in combination, give a high degree of resistance to the 70 races of crown rust collected in North America, but not to race 55, found in South America; they also provide resistance to the 30 races of loose smut and 14 races of covered smut. Other sources of resistance to diseases are being studied. Among these are selections of Hajira x Joanette and Victoria x (Hajira x Banner) developed in Canada, which are resistant to all races of stem rust occurring in both Americas.

**Barley**
Selections with varying degrees of resistance to *Helminthosporium* blight are under test. $F_2$ and $F_3$ disease-resistant selections have been obtained from crosses of standard varieties with Peatland and Chevron.

**Kentucky bluegrass**
In about one-third of the progenies from a selection, some variation in plant types was observed, indicating departures from apomixis. In general, the progenies of plants selected from high unproductive ground were earlier heading and poorer in vegetative growth than those from low land; the effect of natural selection under adverse conditions is thus evident. The tendency of plants from unproductive land towards seed production rather than forage quality was marked. Differences were observed among the progenies in resistance and susceptibility to several leaf diseases.

**Orchard grass**
Strains have been combined to form synthetic varieties, in order to obtain information on the relationship between number of strains combined and their yield in synthetic varieties, on the relationship between combining ability in the top-cross and subsequent yield in synthetic combination, and as a future source of desirable strains.

**Bent grass**
Differences among strains in degree of winter injury have been observed.

**Brome grass**
Cytological investigations indicate that mitosis in root tips is regular. Of 27 plants studied, 5 had a chromosome number of $2n = 56$, and the remainder $2n = 42$.
Correlation values were obtained between the forage yields of multiple cross (top-cross) progenies and those of the parental clones. In general, high yielding clones tended to produce high yielding top-cross progenies, but the correlations were not sufficiently high for the prediction of combining ability. Two synthetic varieties are under test.
A study was made of the effect of different lengths of day upon growth and flowering in three strains.

**Wild rye***
Trials indicate that this crop may be valuable in pasture improvement in combination with sweet clover. Strain No. 364 appears to be promising for this purpose.

**Lespedeza**
L39 shows outstanding tolerance to soil high in lime content. It is also vigorous, early, and shows satisfactory disease resistance.

**Sweet clover**
A total of 130 strains of various origins was planted in the field for further selection and coumarin analysis. Desirable lines of low coumarin content will be combined in synthetic varieties. A new series of crosses was made between a selection with low coumarin content, originating from a cross *M. alba* x *M. dentata*, and several lines developed in Iowa.
The inheritance of annual and biennial growth habit has been studied within *M. alba*, *M. suaveolens*, *M. officinalis* and *M. dentata*, and in crosses between *M. alba* and *M. suaveolens*. $F_2$ segregation for annual and biennial habit within the first three species fits a ratio of 3 : 1, the annual habit showing dominance. $F_2$ segregation in *M. dentata* showed a ratio of 9 annual plants : 7 biennial, suggesting the interaction of complementary genes. Hybrids between the annuals *M. alba* and *M. suaveolens* gave annual and biennial plants in the $F_2$ generation in a ratio of approximately 15 : 1. Considerable sterility was found in the $F_1$ and back-cross generations of the crosses *M. alba* x *M. suaveolens*. Cytological studies are in progress to study the chromosomal relationships in these two species.
The nature and inheritance of self-sterility were studied in *M. officinalis*. Results from crosses between self-sterile and self-fertile strains indicate that the gene $S_f$ for self-fertility is dominant, and that in the self-fertilization of plants heterozygous for $S_f S_z$ only the pollen grains bearing $S_f$ produce tubes that reach the ovary. Sterility in *M. officinalis* was found to be less frequent than is usually the case in *Trifolium repens* or *T. pratense*. It was further demonstrated that levels of fertility are heritable and that selection for higher fertility is effective.

**Bird's foot trefoil**
This crop has given promising results in the pasture improvement programme.
A study has been made of self and cross fertility and of the relationship between the broad and narrow leaf types as revealed by their cytology. The results may be summarized as follows:— (1) The somatic chromosome number of the broad leaf type is 24, that of the narrow leaf 12. The broad leaf type is thus placed as *Lotus corniculatus*, the narrow leaf as *L. tenuis*. (2) Both species are highly self-sterile, but cross-fertile between plants of the same species. (3) *L. corniculatus* and *L. tenuis* are cross-sterile. Although a high percentage of the crosses with *L. tenuis* as the female parent set pods, none of the pods contained viable seed. (4) It was found that the colchicine induced autotetraploid of *L. tenuis* did not cross with *L. corniculatus*. (5) Both broad and narrow leaf types are therefore predominantly cross-pollinated. It is not known which insects are responsible for pollination.

**Potato**
The blight resistance of 42 varieties and seedlings was studied. Three groups of selections showed a relatively low susceptibility. The most resistant groups under field conditions consisted of the hybrids *S. demissum* x *S. tuberosum*, designated TI–5 and AOB/4, and the U.S.D.A. seedlings 528–229 and 627–216. Arnica, the German variety, did not show outstanding resistance, but appeared to have a higher degree of resistance than the third group, which consisted of the U.S.D.A. seedlings, 528–170, 528–242 and 574–14, Hindenburg and Sequoia, and showed slightly less damage than that observed in Cobbler. The reaction of 36 varieties and seedlings to scab was also tested. The 10 strains showing the lowest scab infection were Iowa 500, the U.S.D.A. seedlings 528–34, 528–170, 528–242, 627–103, 627–126 and 627–216, CS 2621, Hindenburg and Arnica.
Seedlings have been produced which are resistant to scab and show some resistance to late blight; their table quality varies from fair to good. With the exception of 46952 they are late maturing. Obtained from the cross Earlaine x 43055, 46952 is a shallow eyed, smooth skinned potato, resistant to pit scab; it is however a light yielder. It is considered that these seedlings will be useful until earlier varieties are developed.

* = *Elymus canadensis* L.

**Hemp**
Intervarietal crosses were made among a number of varieties, and between wild hemp and these varieties.

**Apple**
More than 500 cross-bred and open-pollinated seedlings were planted in 1944, produced from hardy seedlings of known parentage and from a scab resistant strain. Breeding work carried out in the early thirties has produced a number of seedling trees which give fruit of excellent colour and quality.

**Plum**
A number of interspecific hybrid selections produce viable and potent pollen when crossed on other races. This is in marked contrast to the condition of pollen sterility which appears to be almost universal among hybrids between *Prunus salicina* x *P. americana*. Three of the selections show a tendency towards self-fertility.

**Peach**
Breeding work which has for its object the development of varieties with increased hardiness was continued.

**Raspberry**
The work of crossing standard varieties of red and black raspberries with *R. coreanus*, an anthracnose resistant species, is being continued. In addition, standard varieties have been crossed with thornless species of *Rubus*, which appears to be resistant to all fungus diseases of stem and foliage.

**Oak**
It has been proved that *Chalara quercina* is the cause of oak wilt. The following species have shown signs of the infection: *Q. alba, Q. borealis maxima, Q. ellipsoidalis, Q. imbricaria, Q. macrocarpa, Q. marilandica, Q. stellata* and *Q. velutina.*

**Onion**
Bees were introduced into the cages instead of blow-flies, but the amount of seed per bulb was less than when the latter are used to secure pollination.

**Water-melon**
Descriptions are given of two new, early, disease-resistant, hybrid selections, Wilt Resistant Early Queen and Black Kleckley, and two new $F_1$ hybrids, Dixie Hybrid and Kleckley Hybrid. Resistant Early Queen is a home garden type, combining the earliness of Early Market Queen and the rind and seed characters of Hawksberry. The strains are vigorous, prolific and wilt resistant. Black Kleckley is a small, dark green melon of the Klondike type. The quality is good, and the variety is prolific and resistant to wilt and anthracnose. Dixie Hybrid is a $F_1$ melon of the Dixie Queen type. The melons are large, averaging 25–35 pounds, and very uniform in shape and colour. The quality is good and the flesh firm. The hybrid is only moderately resistant to wilt and anthracnose. Kleckley Hybrid is an $F_1$ melon of the Kleckley Sweet type. The melons are long and green, with a tough rind, the average weight being 25–35 pounds. The flesh is firm and very sweet. The hybrid appears to mature earlier than Kleckley Sweet, and is highly resistant to wilt and anthracnose.

**Tomato**
The homozygous autotetraploid derived from a haploid, now in the eleventh generation of selection for high fertility, i.e. seed set, has shown no increase in this character. The original haploid tomato has given no mutations.
Further study has been made of the genetics of fruit size.

**Soya bean**
Promising hybrid selections have been obtained. The selection A45–251, from the cross Mukden x Richland, is particularly valuable. It matures earlier than Lincoln, and has a higher oil content. It is more resistant to lodging than Richland, the most resistant variety previously available. Its yield does not differ significantly from that of Lincoln.
The data from bulk hybrid tests indicate that the $F_3$ or $F_4$ generations are possibly the most desirable in which to select. One object of the breeding programme is the determination of the extent and variation in heterosis of the $F_2$ and $F_3$ generations, to establish a basis for the preliminary selection of hybrid combinations in early generations.
A study was made of the response of five varieties to different rates and dates of planting.

1309. 575:633(78.1)

**Twelfth biennial report of the director, Kansas Agricultural Experiment Station, for the biennium July 1, 1942, to June 30, 1944.**
1944 : Pp. 99.

**Cereals**

Various species and types of cereals were tested for heat resistance. The winter type was decidedly more heat hardy than the spring type of each cereal. Winter oats was more hardy to heat than winter barley or winter wheat and about as hardy as winter rye. Spring oats was more hardy than spring barley or spring wheat.

**Wheat**

The new variety Pawnee (C.I.11669) was released to growers in Central Kansas. The hybrid selection Early Blackhull x Tenmarq (C.I.11952) has been named Wichita. It is a high yielding early maturing variety, but is susceptible to the rusts and smuts occurring in south-west Kansas. The gluten is superior to that of Early Blackhull.

Some strains of rust-resistant, winter wheats have exhibited resistance to bunt and loose smut.

The breeding of a satisfactory hard red winter wheat resistant to *Septoria Tritici*, causing speckled leaf blotch, is in progress. Varieties found to be resistant to the disease are Red Chief, Nittany, Red Rock, Thorne and the hybrid Marquillo x Tenmarq. Many of the winter wheat selections involving the spring wheats Hope and H 44, which are resistant to both leaf and stem rust, show a brown necrosis. This development of colour has been reduced by selection.

Some hybrid selections have shown satisfactory resistance to Hessian fly combined with high resistance to leaf rust. Most of these involve crosses of Marquillo hybrids back-crossed to winter wheats.

Investigations of the factors influencing the qualities of wheat varieties are reported. Several hundred selections were tested for quality. Milling, baking and other data were obtained. The results were used as the basis of selection for quality in early generations.

**Oats**

Promising $F_3$ and $F_6$ selections showed resistance to crown and stem rust, loose and covered smut. The new varieties Ventura (C.I.3989), Osage (C.I.3391) and C.I.4141 possess resistance to smut, crown and leaf rust.

**Maize**

Kansas 2234 is a new late-maturing hybrid of white maize, superior in yield and other qualities to the best open-pollinated varieties and hybrids introduced from other states. Two full-season hybrids of yellow maize have also been produced, Kansas 1583 and Kansas 1585.

**Barley**

Hardy smooth-awned selections of winter barley were obtained from the cross Purdue C.I.6562 x Reno. The varieties Compana, Trebi x Dryland Selection 69 and Odessa x Dryland Selection 21 showed resistance to brown loose smut infection.

**Sorghum**

The cross Club x Westland appears to be promising as a source of dwarf, chinch-bug resistant types suitable for combine harvesting. Two promising dwarf selections of the kafir type have been obtained from the cross Weskan x Greeley. Smut resistant forage and grain sorghums were selected from various crosses.

The study of the quality of starches derived from varieties of grain sorghum commonly grown in Kansas and from glutinous hybrids has been continued.

**Forage grasses**

Strains of brome grass have been subjected to high temperature in the seedling stage. In general all strains were found to be highly resistant to heat. To obtain differential killing, exposure of the plants to temperatures destroying almost the entire top growth was necessary.

Promising strains of Sudan grass include a selection from the cross Sudan x Johnson grass which shows considerable resistance to chinch bugs.

**Lucerne**

Buffalo, a wilt resistant variety developed from Kansas Common, has been released for commercial production. Several new wilt-resistant selections of Kansas Common have been obtained which are superior to Buffalo in hay yield.

The development of hybrid alfalfa is now included in the breeding programme. As a first stage of this work, many individual selections have been tested for resistance to cold, wilt and black stem.

**Flax**
Breeding work in progress has as its objective the development of rust and wilt resistant varieties with valuable agronomic qualities.

**Cucumber**
Selections of small pickling, large pickling, and slicing types have been obtained from a mosaic resistant hybrid.

**Popcorn**
The new popcorn hybrids KP 1001, KP 1003 and KP 1004 have yielded 25–75% more grain than Supergold and South American open-pollinated varieties. Their quality is excellent, and the popping expansion good.

1310. MAROTTA, F. P. 575:633(82)
La Facultad de Agronomía y Veterinaria en la Universidad. (**The Faculty of Agronomy and Veterinary Science in the University**).
Buenos Aires 1936–40 (1943) : Pp. 664.

This volume devoted to the activities of the Agronomy and Veterinary Faculty of the University of Buenos Aires during the period 1936–40 contains an account of the foundation of the Institute of Genetics and of its programme of work. This includes genetical and breeding work in maize and wheat, breeding work with barley, flax, lucerne, soya bean and various vegetables, interspecific crosses in *Poa*, *Triticum*, *Secale*, etc., studies of self-sterility in the plum variety D'Agen and a study of the local forms of potato and of the possibilities of improving them by intervarietal and interspecific crossing.

1311. CHAVARRIAGA MISAS, E. 575:633(87)
El Departamento de Genética del Ministerio de Agricultura y Cria de los Estados Unidos de Venezuela. (**The Genetics Department of the Ministry of Agriculture and Stock of the United States of Venezuela**).
Rev. Fac. Nac. Agron., Colombia 1944 : **5** : 239–43.

Reference is made to the new maize types Venezuela–1 to 3 (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 208) already produced and to the extensive maize breeding work now in progress in Venezuela.
A tetraploid plant of *Sesamum indicum* has been produced by colchicine treatment and several improved varieties have been produced, the best being V 40–10 and V 40–15.
Breeding work has now been started with cotton and rice.

1312. BRANDL, M. 575:633:007(43.6)
Das Werden der Pflanzenzüchtung in der Ostmark. (**The development of plant breeding in Austria**).
Z. Pflanzenz. 1941: **24** : 395–97.

A brief historical account is given of plant breeding work in Austria, with particular reference to the work of E. von Tschermak. S. E.

1313. ARZUAGA, J. G. 575:633:007(82)
Homenaje al Ing. Agr. Enrique Klein en el 25° aniversario de la fundación de su "Criadero Argentino de Plantas agrícolas". (**Homage to Enrique Klein on the 25th anniversary of the foundation of his "Argentine Centre for the Production of Agricultural Plants."**
Rev. Argent. Agron. 1944 : **11** : 328–30.

A brief account is given of E. Klein and of his work in breeding new varieties of cereals for Argentina and adjacent countries.

## *GENETICS 575.1

1314. 575.1:001.4
Symbolisierung der Gene und der Chromosomabweichungen. (**Symbolization of genes and chromosome aberrations**).
Z. Pflanzenz. 1940 : **23** : 485–86.

The proposals arising out of the international deliberations in London, 1939, on gene symbolization are set out. Delegates from Belgium, Italy, Finland and Japan were not present.

---

* General studies, see also individual crops.

1315. NICHOLSON, C. 575.1:581.9
Fitogeografia genética. **(Phytogeographical genetics).**
Rev. Univ. Arequipa 1939 : **12** : No. 14 : 19–56.
Chapters are given from a forthcoming book by the author on phytogeographical genetics. The plasticity and distribution of plants is demonstrated by bringing forward evidence from the various allied sciences, such as geology and palaeontology, in addition to outlining the main theories of plant geography. J. G. H.

1316. LUDWIG, W. and
FREISLEBEN, R. 575.116.1:519.24
Über neuere statistische Methoden zur Auswertung von Koppelungsversuchen, vor allem in der Pflanzenzüchtung. **(New statistical methods for the evaluation of linkage experiments, especially in plant breeding).**
Z. Pflanzenz. 1942 : **24** : 523–38.
The theory and application of the $\chi^2$ method for determining linkage in genetical experiments are described. It is stated that this paper is abstracted from a manuscript "Taschenbuch der modernen biologischstatistischen Methoden usw.", which the senior author was prevented from publishing owing to the outbreak of war.

1317. 575.127:576.31
SAVČENKO-BELJSKIĬ, A. 581.165.71:576.31
**(Something new in the analysis of breeding material).**
Socialističeskoe Zemledelie (Socialist Agriculture), 1944 : No. 111 : p. 2.
E. M. Vermelj, working in N. V. Cicin's institute, has found that the size of the smallest cells in the plant is characteristic for a species and the size of the successively larger cells increases in geometrical progression. This characteristic cell size serves as an index of how far any given species can be expected to be compatible with another species in grafting or distant hybridization. Examples where the principle has proved applicable include grafts of *Cyphomandra* on tomato and crosses between *Triticum* and *Agropyron*. The success of vegetative rapprochement for the purpose of wide crossing is ascribed to the modification of the cell size which it induces.

1318. GREENSTEIN, J. P. and
CHALKLEY, H. W. 575.17
**The influence of nucleic acid on dehydrogenase systems. A contribution to the problem of gene mechanism.**
Ann. Mo. Bot. Gdn 1945 : **32** : 179–85.
Evidence has been obtained that desoxyribose nucleic (thymonucleic) acid has a direct effect upon the enzymatic systems of the cell. The possible implications of this result upon the mechanism of the gene are discussed.

1319. EMERSON, S. 575.17
**Genetics as a tool for studying gene structure.**
Ann. Mo. Bot. Gdn 1945 : **32** : 243–49.
Indirect evidence suggesting that the specificity of the gene resides in its unique surface configuration is discussed.

1320. SONNEBORN, T. M. 575.182
**Gene action in *Paramecium*.**
Ann. Mo. Bot. Gdn 1945 : **32** : 213–21.
Experiments have shown that the cytoplasmic factor *k* is a dissociable part of gene *K*.

## VARIATIONS, MODIFICATIONS, MUTATIONS 575.2

1321. IGNATIEV, M. V. and
SHAPIRO, N. I. 575.24:575.41:575.113.5
**Ways of genotype stabilization. II. Selection of modifying factors for mutability.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1945 : **46** : 122–26.
A study has been made of the evolution in plant and animal species of modifying factors which reduce the mutability of the genotype.

1322. HOLLAENDER, A. 575.243:535.61–31:537.531:632.42
**The mechanism of radiation effects and the use of radiation for the production of mutations with improved fermentation.**
Ann. Mo. Bot. Gdn 1945 : **32** : 165–78.
A survey is given of papers dealing with the response of viruses, bacteria and other organisms to ultra-violet light and X-irradiation, and the problems of inducing economically valuable mutations in *Aspergillus* and *Penicillium*.

1323. THOMAS, J. A. and CHEVAIS, S. 575.243:581.04
Production expérimentale de mutations par les trois aminophénylsulfamides isomères, chez la mouche *Drosophile*. Action sur les cellules males. (**Experimental production of mutations by the three isomeric aminophenylsulphamides in the fly *Drosophila*. Effect on the male cells**).
C.R. Soc. Biol., Paris 1945 : **137** : 185–87.
Mutations have been induced in *Drosophila* by the ortho, meta and para isomers of aminophenylsulphamide.

1324. LANDAUER, W. 575.35
**Shall we lose or keep our plant and animal stocks**?
Science 1945 : **101** : 497–99.
The institution of a scheme for conserving genetical stocks and mutants of possible future value is urged.

## ORIGIN OF SPECIES 576.1

1325. JUST, T. K. 576.12
**The rates of evolutionary processes.**
Proc. Ind. Acad. Sci. 1944 : **53** : 14–27.
[From Biol. Absts 1944 : **18** : Sect. A : p. 1966 : Abst. 18576].
"The term species is applied to groups of very different ecological and genetical status. As a result speciation must progress by various modes and at different rates. Examples of estimated and known rates of evolutionary processes affecting both higher and lower systematic categories are presented, including cases of slow (modern horse) as well as rapid evolution (by mutator genes, ploidy, etc.). The compatibility of genetical and paleontological knowledge is also demonstrated. Although the occurrence of unstable genes, mutation rates, hybridization, ploidy, etc., are admittedly not the only effective evolutionary factors, they represent some of the most important agencies and indicators of evolutionary changes. The rates of evolutionary processes differ so greatly that they can not be expressed in simple mathematical terms".
[Author's summary.]

1326. KIRPICHNIKOV, V. S. 576.12:575.24
**(The adaptive character of intraspecific systematic variation. I. On the adaptive significance of mutations).**
J. Gen. Biol. 1944 : 5 : 172–92.
The author enquires once more into the question as to whether the majority of intraspecific differences are adaptive or non-adaptive. A rather full review is given of the literature dealing with adaptive mutations. It is pointed out that the majority of mutations are deleterious because they cause deviations from the finely balanced equilibrium between the organism and its environment. From this however it follows that when the environment changes some of these slight deviations may prove better adapted than the original form. A store of mutants such as has been discovered in many wild species investigated is obviously an advantage in providing possible adjustments to variations in environment.
In the course of evolution, the regulatory mechanisms have developed more and more and organisms have become progressively more independent of environment. This has been accompanied by a decrease in mutability and a tendency towards greater recessiveness of the mutations; hence the mutations tend to be less deleterious and the chances of valuable mutants occurring are increased. The mutations tend less and less to affect the whole organism and come to affect one small part of the regulatory process, often producing a threshold effect which in certain sets of circumstances may have a positive selection value. Mutations with the least pronounced effect

have the greatest chance of being useful, since they cause the least disturbance to the general development and functions of the organism. It is suggested that many of the small mutations that under the very constant conditions of the laboratory are less viable than the original, might, under the more variable conditions of nature, prove more viable. It is pointed out in this connexion that certain mutations are known which have a positive selection value in the heterozygous condition but are lethal when homozygous.

The effectiveness of selection under natural conditions has been demonstrated by a great number of authors, who have shown that, when environmental conditions change, the main role is played by the numerous small mutations present in natural populations; in this way very rapid changes in physiological characteristics such as cold resistance can be effected.

Recent estimates of the total mutation frequency have put it at 10% and some as high as 40%; some mutable genes giving 100% mutation have also been reported. Mutation frequency is thus regarded as quite high enough to account for the rapid changes resulting from natural selection that have been observed. Dubinin has observed 3% of progressive homozygous mutants, and other evidence, though scattered, points to the existence of useful mutations in nature. It is pointed out that a gene can rarely be classed as useful when acting alone; the best combination of all the genes in the organism is what decides the result of natural selection, and it is not the genes as such that survive, but the most successful gene combinations. It is very rare that any mutant is completely recessive and exerts no effect whatever on this sum total of the gene combinations.

## *CYTOLOGY 576.3

1327. DANGEARD, P. 576.312.3:635.25
Sur la membrane des noyaux dans les cellules épidermiques des écailles bulbaires d'*Allium cepa*. (**The nuclear membrane in the epidermal cells of the bulb scales of *A. cepa*).**
C.R. Soc. Biol., Paris 1943: **137** : 233–35.

An examination has been made of the nuclei of epidermal cells of onion scales after immersion in water and staining with a dilute solution of dahlia violet. Special attention has been paid to the nuclear membrane which was clearly differentiated and seen to consist of an extensible material, two layers thick in some places. These observations are figured.

1328. MANTON, I. 576.312.34:576.354.4
**New evidence on the telophase split in *Todea barbara*.**
Amer. J. Bot. 1945 : **32** : 342–48.

Ultra-violet photographs are published of the meiotic chromosomes of *Todea*. Not less than four component strands appear to constitute each chromosome and fission in the strict sense may not occur at all, but rather, bundles of chromosome strands may separate, each of which has long had an individual existence.

1329. LÖVE, A. and
LÖVE, D. 576.312.35(48)
**Cyto-taxonomical studies on boreal plants. II. Some notes on the chromosome numbers of Juncaceae.**
Ark. Bot. 1944 : **31B** : No. 1 : 1–6.

LÖVE, A. and
LÖVE, D.
**Cyto-taxonomical studies on boreal plants. III. Some new chromosome numbers of Scandinavian plants.**
Ibid. 1944 : **31A** : No. 12 : 1–22.

The chromosome numbers of approximately 170 Scandinavian plants are reported, including those of several species not previously investigated.

1330. DEVAUX, H. 576.353
La théorie électrique de la mitose. (**The electrical theory of mitosis**).
C.R. Soc. Biol., Paris 1943 : **137** : 237–38.

By floating mustard or rice grains on mercury and charging them by electrostatic induction, the author has succeeded in obtaining figures comparable to the disposition of chromosomes in the equatorial plate of metaphase. This analogy is believed to support the hypothesis that mitosis proceeds, in part at least, under the influence of electrostatic forces.

---

* General studies, see also individual crops.

1331. Nihous, M. 576.356:581.04:635.656
Effets cytophysiologiques d'un traitement colchicique mortel, chez l'embryon du pois cultivé en germination. (**Cytophysiological effects of a lethal treatment with colchicine on germinating embryo of the cultivated pea**).
C.R. Soc. Biol., Paris 1944 : **138** : 534–35.

Among the phenomena observed in pea embryos 5–6 days after a three hours immersion of the seeds in an aqueous solution of colchicine were: gigantism of some cells; fragmentation of nuclei, which had become very irregular, into many secondary nuclei; breaking up of the nuclear chromatin into fine granular and other particles, rods, etc.; giant mitoses with very large viscous chromosomes (8–10$\mu$), forming metaphase figures with a rather dense reticulum; and irregularly lobed nuclei, each lobe of which, on becoming isolated with a secondary nucleus, produces multi-nucleate cells.

1332. Witkus, E. R. 576.356.5:576.312.315:635.41
**Endomitotic tapetal cell divisions in *Spinacia*.**
Amer. J. Bot. 1945 : **32** : 326–30.

One or two successive endomitotic divisions may take place in the tapetal cells of *Spinacia oleracea*, resulting in the formation either of tetraploid or octoploid cells. The nucleolus persists throughout endomitosis.

1333. McKay, J. W.,
Burrell, P. C. and
Goodhue, L. D. 576.356.5:581.04:578.08
**Applying colchicine to plants by the aerosol method.**
Science 1945 : **101** : 154–56.

A new technique for inducing polyploidy by means of colchicine is described. A "colchicine bomb" is prepared by dissolving 0·5 grm. of colchicine in 4·5 grm. of cyclohexanone and introducing the solution into a small steel cylinder, thereafter adding 95 grm. of methyl chloride under pressure. The "bomb" should have a 10-inch copper nozzle. From this apparatus a colchicine aerosol can be directed on to all the exposed surfaces of the plants to be treated. A chemical hood is necessary owing to the poisonous nature of the aerosol.

1334. Fabergé, A. C. 578.08:576.3
**Snail stomach cytase. A new reagent for plant cytology.**
Stain Technol. 1945 : **20** : 1–4.

An active mixture of cytase and other enzymes present in the stomach of *Helix pomatia*, the edible snail, makes an excellent macerating medium for squash preparations of root-tips and similar tissues.

## *BOTANY 58

1335. 58:007
Wettstein, F. von. 016
Erich von Tschermak-Seysenegg zum 70. Geburtstag. (**For Erich v. Tschermak-Seysenegg on his 70th birthday**).
Z. Pflanzenz. 1941 : **24** : 301–03.

Veröffentlichungen von E. v. Tschermak-Seysenegg. (**Publications of E. v. Tschermak-Seysenegg**).
Ibid. 1941 : **24** : 409–12.

Rudorf, W.
Verleihung des Carl Sigismund von Treskow-Friedrichsfelde-Preiss an Herrn Hofrat Prof. Dr Dr h.c. Erich Tschermak von Seysenegg. (**Presentation of the Carl Sigismund von Treskow-Friedrichsfelde prize to Councillor Prof. Dr honoris causa Erich Tschermak von Seysenegg**).
Ibid. 1941 : **24** : 413–14.

The first two papers contain an account of von Tschermak's contributions to genetics and plant breeding. The bibliography contains 102 titles, extending from 1896 to 1941. S. E.

* General studies, see also individual crops.

1336. Simonet, M. and
Igolen, G. 581.04:576.356:633.16
Action de quelques dérivés de la quinoléine sur la mitose de l'orge. (**The action of some derivatives of quinoline on mitosis of barley**).
C.R. Soc. Biol., Paris 1944 : **138** : 234–35.

Three quinoline compounds used at different concentrations on barley seeds all produced caryocinetic anomalies similar to those induced by colchicine treatment, including high polyploid numbers (4, 8, 16 and 32), inhibition of the spindle, the typical phenomena of stathmocinesis, e.g. pseudo-metaphase, pseudo-anaphase and pseudo-telophase (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 561), and other nuclear aberrations.
Experiments of other workers on this subject are mentioned.

1337. Greulach, V. A. 581.143.26.035.1:001.4
**"Photoperiodism" versus "photoperiodicity".**
Science 1945 : **101** : 353–54.

A short discussion is presented of the relative values of the two synonyms "photoperiodism" and "photoperiodicity".

1338. Charetschko-Sawizkaja, H. 581.162.3:575.3:633.41
Selektive Befruchtung. (**Selective fertilization**).
Z. Pflanzenz. 1944 : **26** : 187–98.

Experimental data are brought forward against Lysenko's theory of selective fertilization, and it is shown that in the case of the beet, the pollen which actually affects fertilization in a pollen mixture is not necessarily that which would produce the most vigorous offspring. The data of other authors on mixed pollination are reviewed and shown to accord with present-day genetical conceptions.
Approaching the question also from the theoretical angle, the authoress shows that natural selection can only operate during pollination to favour the pollen grains best adapted to the environment of the style. There is no necessary connexion between this and the adaptation of the offspring to their environment. Any attempt to establish such a necessary relation must either attribute the exercise of reason to the ovum or postulate an underlying teleology, both of which concepts are held to be anti-Darwinian. It is pointed out finally that any connexion between the adaptability of pollen grains to the style and the adaptation of the offspring to their environment must be approached by the methods of population genetics.

1339. Jensen, I. and
Bøgh, H. 581.162.32:633.2
Om Forhold, der har Indflydelse paa Krydsningsfaren hos vindbestøvende Kulturplanter. (**On conditions influencing the risk of crossing among wind-pollinated crop plants**).
Tidsskr. Planteavl. 1941 : **46** : 238–66.
[From Nord. JordbrForskn. 1942 : **24** : 250–51].

Time of flowering was investigated in rye, cocksfoot, rye-grass, timothy and beetroot. Special methods were used to measure the distribution of pollen at various distances from the seed plot and the factors affecting the amount of pollen carried. The influence of the size and shape of the field on cross-pollination was also examined and it was concluded that spatial isolation should be greatest in the case of small plots.

1340. Fagerlind, F. 581.33
Der tetrasporische Angiospermen-Embryosack und dessen Bedeutung für das Verständnis der Entwicklungsmechanik und Phylogenie des Embryosacks. (**The tetrasporic angiosperm embryo-sac and its significance for the understanding of the mechanism of development and the phylogeny of the embryo-sac**).
Ark. Bot. 1944 : **31A** : No. 11 : 1–71.

A detailed comparative account is given of the morphology, cytology and ontogeny of the various types of tetrasporic embryo-sac encountered in the angiosperms. Attention is also given to the cytology of the endosperm. The relative importance and inter-relations of the types described are discussed and a critical examination is made of the various phylogenetic theories that have been put forward to cover these facts.

1341. Schwarze, P. 581.6:575
Über die Methodik der Auslese eiweissreicher Zuchtstämme und die Variabilität der Eiweissqualität in Zuchtmaterial. (**The technique of selecting breeding lines rich in protein and the variability of protein quality in breeding material**).
Z. Pflanzenz. 1944 : **26** : 1–55.

Extensive details are given of the methods of chemical analysis used at Müncheberg for the estimation of the protein content of biological material. This account is followed by a description of the techniques used for determining the digestibility and nutritive value of the various proteins encountered.

1342. Croizat, L. 582
**History and nomenclature of the higher units of classification.**
Bull. Torrey Bot. Cl. 1945 : **72** : 52–75.

A historical review is given of the fundamental literature concerned with classification which appeared in 1735–89. This includes the works of Linnaeus, Adanson, Haller, Gleditsch, Lamarck, A. L. de Jussieu, Ventenat and Necker.

Present-day problems of the nomenclature of units higher than the genus are discussed. The suggestions are made that names representing units between the genus and class should be recognized by their endings, disregarding if necessary the original designation of rank, and that similar names with endings other than Latin ones should be considered as legitimate.

1343. Gray, W. D. 582.4:581.162.5:576.16
**The existence of physiological strains in *Physarum polycephalum*.**
Amer. J. Bot. 1945 : **32** : 157–60.

Evidence is presented to support the suggestion that the myxomycete *Ph. polycephalum* Schw. is differentiated into physiological races incompatible *inter se*.

## AGRICULTURE 63

1344. Bruman, H. J. 631.524(8)
Crítica de las investigaciones rusas sobre genética vegetal en la América Latina y el significado de esta última para la historia de la civilización. (**Critique of the Russian investigations on plant genetics in Latin America and the significance of this latter in the history of civilization**).
Rev. Univ. Arequipa 1938 : **11** : No. 13 : 49–63.

The author gives an account of the botanical studies on the origin of crop plants that have thrown light on the remote past, dealing chiefly with the work and theories of the Russian geneticists headed by N. I. Vavilov. Special reference is made to the indigenous crop plants of Latin America. J. G. H.

## *PLANT DISEASES AND PESTS 632

1345. Delbrück, M. 632.3:575.242
**Spontaneous mutations in bacteria.**
Ann. Mo. Bot. Gdn 1945 : **32** : 223–33.

Problems and methods of the investigation of bacterial mutants are discussed.

1346. Demerec, M. 632.3:575.242:632.421.2–1.521.6
**Genetic aspects of changes in *Staphylococcus aureus* producing strains resistant to various concentrations of penicillin.**
Ann. Mo. Bot. Gdn. 1945 : **32** : 131–38.

Strains resistant to penicillin were developed which retained that property after 20 transfers on a broth medium. Resistance appears to originate by a change comparable with mutation. It was also found that the degree of resistance can be increased by selection, this increase becoming more rapid with each selection.

1347. Chapman, G. H. 632.3:576.16:001.4
**The concept of a "strain" in bacteriology.**
Science 1945 : **101** : 429–30.

The use of the term "strain" in bacteriology is deprecated as it is believed to have a different implication from that understood in connexion with higher organisms. "Dissociant" and "culture" are suggested as alternative terms.

*General studies, see also individual crops.

1348. Luria, S. E. 632.3–2.8–1.521.6:575.11
**Genetics of bacterium-bacterial virus relationship.**
Ann. Mo. Bot. Gdn 1945 : **32** : 235–42.
A review is given of recent papers.

1349. Hollaender, A.,
Raper, K. B. and
Coghill, R. D. 632.421.2:581.192:535.61–31:575.243
**The production and characterization of ultraviolet-induced mutations in *Aspergillus terreus*. I. Production of the mutations.**
Amer. J. Bot. 1945 : **32** : 160–65.
The technique of mutation production in *A. terreus* Thom by means of ultra-violet irradiation is described. Eleven types of mutant were produced, differing in various morphological and biochemical properties. Special attention was paid to the yield of itaconic acid given by these mutants, but only a few produced more than the parent strain.

1350. Myers, W. G. and
Hanson, H. J. 632.421.2:581.6:539.185.9:575.243
**New strains of *Penicillium notatum* induced by bombardment with neutrons.**
Science 1945 : **101** : 357–58.
By bombarding spore suspensions of *P. notatum* with neutrons, about 100 new strains have been produced, varying in such characters as morphology, rate of sporulation and yield of antibiotic substances.

1351. Edgerton, C. W.,
Chilton, S. J. P. and
Lucas, G. B. 632.421.9:576.37
**Genetics of *Glomerella*. II. Fertilization between strains.**
Amer. J. Bot. 1945 : **32** : 115–18.
By combining appropriate strains of *Glomerella* sp., fertilization and subsequent segregation during ascospore formation have been demonstrated.

1352. Tatum, E. L. and
Beadle, G. W. 632.421.9:577.15:575.11
**Biochemical genetics of *Neurospora*.**
Ann. Mo. Bot. Gdn 1945 : **32** : 125–29.
A review is given of work upon the genetics of enzyme production. Results so far obtained are found to support the hypothesis of a specific relationship between gene and enzyme.

1353. Renaud, J. 632.422.3:537.531:575.243
Les races de levures obtenues par irradiation sont-elles semblables aux races naturelles? (**Are the yeast races obtained by irradiation similar to natural races?**)
C.R. Soc. Biol., Paris 1943 : **137** : 131–32.
It is believed that the aberrant yeasts obtained by X-irradiation have no analogues among naturally occurring forms. The magnitude of the difference increases with the intensity of the X-irradiation used to obtain the mutants; forms obtained after comparatively mild treatments are not significantly different from wild races.

1354. Nègre, E. 632.422.3:575.42
Jules Ventre (1880-1939). [**Jules Ventre (1880-1939)**].
Ann. Éc. Agric. Montpellier 1941 : **26** : 61–94.
This obituary notice includes a reference to Ventre's work in the investigation and selection of yeast races.

1355. Lindegren, C. C.,
Spiegelman, S. and
Lindegren, G. 632.422.3:576.16
**Survey of growth and gas production of genetic variants of *Saccharomyces cerevisiae* on different sugars.**
Arch. Biochem. 1945 : **6** : 185–98.
A comparative study has been made of growth and gas production in 1450 genetically different strains of *S. cerevisiae*. A wide range of physiological types was found within each strain.

1356. SPIEGELMAN, S. 632.422.3:577.15:575.3:575.182
**The physiology and genetic significance of enzymatic adaptation.**
Ann. Mo. Bot. Gdn 1945 : **32** : 139–63.

A discussion is given of the general problem of enzymatic adaptation in yeasts. Experiments are described, the results of which indicate that the formation of galactozymase and melibiozymase is dependent upon genetic constitution only for its initiation, adaptation being brought about by the interaction of the cytoplasm and the specific substrate.

1357. 632.422.3:581.16:575.11
LINDEGREN, C. C. 632.422.3:577.15:575.3:575.182
**Mendelian and cytoplasmic inheritance in yeasts.**
Ann. Mo. Bot. Gdn 1945 : **32** : 107–23.

Reasons are advanced for distinguishing between haplophase and diplophase. Experimental work has indicated that alleles a and *a*, determining mating type, show typical Mendelian inheritance, and that apparently other genes may act as modifiers. It has also been demonstrated that the initiation of adaptive enzymes is under genetic control.

1358. HIRSCHHORN, E. 632.451.2:576.356
**A cytologic study of several smut fungi.**
Mycologia 1945 : **37** : 217–35.

An account is given of the mode of germination of the chlamydospores of *Ustilago Williamsii* (Grif.) Lavr., *U. Spegazzini* var. *agrestis* Fisch. et Hirsch., *U. halophila* Speg. and *Sorosporium consanguineum* Ellis et Ev., special attention being paid to the details of nuclear behaviour. In all cases the chlamydospore is diploid but reduction division may be delayed until the third or later divisions. All the chromosomes may not undergo reduction simultaneously, an occurrence which sometimes results in the formation of hyphae possessing nuclei of differing chromosome numbers. Variation was noted in the nature and development of the hyphae, whether haploid, dicaryotic or diploid.

## ECONOMIC PLANTS 633

1359. ROEMER, TH. 633:575:007(43)
Professor Dr Rudolf Freisleben. **(Professor Rudolf Freisleben).**
Z. Pflanzenz. 1944 : **26** : 163–64.

This obituary notice summarizes the genetical and plant breeding studies of the late Professor Freisleben.

1360. 633:581.6:575
GARBER, R. J. 633:577.16:575
**Plant breeding in relation to human nutrition.**
Science 1945 : **101** : 288–93.

The important role of the plant breeder in helping to bring about a higher nutritional standard for the world as a whole is indicated. This end is served either by increasing yields, improving disease resistance, or by developing varieties with a high content of nutrients and vitamins. Co-operation between breeders and nutritionists should be close.

1361. CICIN, N. V.
*et al.* (Editors) 633.00.14(47)
**(The regionalization of approved varieties of cereal plants, sunflower, soya bean, lucerne and clover).**
Gosudarstvennaja Komissija po Sortoispytaniju Zernovyh Kultjur pri N.K.Z. S.S.S.R. (State Commission for the Organization of Varietal Tests of Cereal Crops attached to the Peoples' Commissariat of Agriculture of the U.S.S.R.), Seljhozgiz, Moscow 1939 : Pp. 200.

This volume, compiled by the chairman and members of the above State Commission, consists of two parts. The first contains the report presented by the Commission to the Council of People's Commissars of the U.S.S.R. early in 1939. The second part is devoted to the actual programme of regionalization of approved varieties of 16 crops and contains six appendices. The recommendations of the Commission are based mainly upon the results of varietal tests in 1938 and previous years. Figures are given indicating the area under cultivation of each crop, and the percentage of approved varieties in relation to the total area producing each crop. The crops

listed are: winter and spring wheats, winter rye, winter and spring barleys, millet, buckwheat, maize, rice, peas, lentils, beans, soya beans, sorghum, vetches, lucerne, clover, *Lathyrus* and *Cicer arietinum*. In appendix I the programme of regionalization is given for most of these crops. New varieties to be commercially produced are enumerated in appendix II. Promising varieties to be tested under conditions of commercial production are given in appendix III. Varieties which have been discarded or those which will undergo no further testing are listed in appendices IV and V. The average yields of the most important varieties are tabulated in appendix VI.

1362. Cicin, N. V.
*et al.* (Editors) 633.00.14(47)
**(The results of the state varietal tests for 1940. Part I. Red clover, lucerne, Sudan grass, *Setaria italica*, vetches).**
Gosudarstvennaja Komissija po Sortoispytaniju Zernovyh Kultjur pri N.K.Z. S.S.S.R. (State Commission for the Organization of Varietal Tests of Cereal Crops attached to the Peoples' Commissariat of Agriculture of the U.S.S.R.), Seljhozgiz, Moscow 1942 : Pp. 384.

In 1940 the total area under cultivation of red clover was estimated as 4·6 million ha. The highest yields of clover hay on the model farms varied from 60 to 85 centners per ha., the seed yield from 3·5 to 9·9 centners per ha. In the year under review 14 approved selected and local varieties were tested.

The total acreage of lucerne in 1940 was 4·07 million ha. About 60% of this acreage was sown under local varieties and not more than 10% under selected foreign varieties; the remaining acreage was sown with untested seed. In all 79 varieties were tested. The yields showed considerable variation, in some instances reaching 485 centners per ha. On non-irrigated lands in Central Asia 12–18 centners per ha. were harvested.

The acreage of Sudan grass and *Setaria italica* in 1937 is estimated at 152·1 and 314·9 thousand ha. respectively, mainly in the south and south-eastern provinces of the Soviet Union. During 1940, 29 varieties were tested. Yields of Sudan grass fluctuated from 77·8 to 96·3, yields of *S. italica* from 46·5 to 66·7 centners per ha.

Vetches are grown throughout the Soviet Union, but no reliable statistics of acreage are available. Tests of 47 varieties were carried out in 1940. The average yield of hay and seed of the best varieties was 23 and 7 centners per ha. respectively.

1363. Cicin, N. V.,
Konstantinov, P. N.,
Pisarev, V. E.,
Jurjev, V. Ja and
Jakuškin, I. V. (Editors) 633.00.14(47)
**(The results of the state varietal tests for 1939. Part IV. Millet, buckwheat, maize, sorghum and sunflower).**
Gosudarstvennaja Komissija po Sortoispytaniju Zernovyh Kultjur pri N.K.Z. S.S.S.R. (State Commission for the Organization of Varietal Tests of Cereal Crops attached to the Peoples' Commissariat of Agriculture of the U.S.S.R.), Seljhozgiz, Moscow 1941 : Part IV : Pp. 200.

This volume is the concluding part of a series (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 1188). In 1939 there were 3·26 million ha. under approved varieties of millet. Out of 264 varieties tested during this year 62 named varieties were developed in the Soviet Union. The following varieties formed the bulk of the crop: Saratovskoe 853, Podoljanskoe 24/273, Krasnoe Toïdenskoe 215, Krasnokutskoe 19/273, Saratovskoe 742 and Bezenčukskoe 2. Yields varied from 4·0 to 48·4 centners per ha. according to the district and to climatic conditions.

Less than 2% of the total area of cultivation of buckwheat was sown to varieties undergoing tests. In all 267 varieties were tested. Ninety-two per cent. of the area was sown to the variety Bogatyrj (Champion). Yields varied from 2·4 to 23·3 centners per ha.

The following varieties formed the bulk of the 1939 maize crop: Brown County, Minnesota 13 extra, Sterling, Gruševskaja, Minnesota 23, Harjkovskaja and a white Caucasian hybrid. Yields ranged from 1·2 to 62·5 centners per ha.

Sorghum, a comparatively new crop in the U.S.S.R., was planted mainly in the Northern Caucasus, Lower Volga, Crimea, the Ukrainian S.S.R. and the Kazah S.S.R. Forty varieties

were tested in the year under review, the grain yield varying from 3·5 to 24·9 and the forage yield from 11·2 to 144·5 centners per ha.
Out of the 49 varieties of sunflower tested during the year, the following were chiefly used, Saratovskiĭ 169, Ždanovskiĭ 8281, Ždanovskiĭ 6462 and Fuksinka 62. The seed yields varied from 2·6 to 28·3 centners per ha. The oil content ranged from 27·13 to 41·29%.

1364. Webster, G. T. 633.00.14(78.2)
**Nebraska outstate crops and soils tests. Variety tests for 1944.**
Bull. Neb. Agric. Exp. Sta. 1945 : No. 372 : Pp. 38.
A report is given of tests distributed throughout Nebraska. The crops included maize, wheat, oats, barley, sorghum, various grasses, *Lespedeza*, field bean and soya bean.

## CEREALS 633.1

1365. Woodward, R. W. 633.1:575(79.2)
**How new varieties of small grains are produced.**
Fm Home Sci., Utah 1945 : **6** : No. 2 : 6–7, 16.
A popular account is given of the work of breeding new varieties.

1366. 633.1:581.6(73)
633.52:581.6(73)
Glick, D. 635.655:581.6(73)
**The choline content of pure varieties of wheat, oats, barley, flax, soybeans, and milled fractions of wheat.**
Cereal Chem. 1945 : **22** : 95–101.
A determination has been made of the choline content of varieties of wheat, oats, barley, flax and soya bean.

1367. Drahorad, F. 633.1–1.524:575(43.6)
Gebirgspflanzenzüchtung mit besonderer Berücksichtigung des Getreidebaues.
(**Plant breeding for mountain regions with particular reference to cereal cultivation**).
Z. Pflanzenz. 1941 : **24** : 352–62.
The extreme ecological diversity of alpine regions is pointed out. Because of this, it is suggested that plant breeding in such areas should not be centralized, but should be conducted at a series of stations in different ecological zones, as is the case in Austria. Local land races of cereals have become closely adapted to the rigorous environmental conditions encountered. In general they are resistant to drought and to frost, and have a short growing season. It is suggested that the improvement of these local races is the most promising method of breeding. Pure lines should not be aimed at. The physiological diversity of the old varieties should be maintained in order to retain reliability of yield in different seasons. The importance of using in yield tests such cultural methods as are normally practised in the district concerned is made clear. S. E.

1368. Atkinson, R. E. 633.1–2.8–1.521.6(75.6+75.7)
**Mosaic of wheat in the Carolinas.**
Plant Dis. Reporter 1945 : **29** : p. 86. (Mimeographed).
Data have been obtained of the reaction of wheat and rye varieties to wheat mosaic.

## WHEAT 633.11

1369. Wells, J. G. (jun.),
Clanahan, D. L. and
Churchill, B. R. 633.11:575(77.4)
**Regent wheat for the Upper Peninsula.**
Quart. Bull. Mich. Agric. Coll. 1945 : **27** : 298–300.
The new variety Regent, developed in Manitoba and released for distribution in 1939, has outyielded the varieties Progress and Thatcher. The variety was selected from the cross H–44 x Reward. It is a beardless, red spring wheat of early to mid-season maturity. In the Upper Peninsula, the variety is medium-tall, resistant to lodging, and highly resistant to stem and leaf rust and covered smut.

1370. HANISCH, H. 633.11:575:581.056(43.72)
Klimabedingtheit der Weizenzüchtung in Südmähren. (**Climatic factors conditioning wheat breeding in Southern Moravia**).
Z. Pflanzenz. 1941 : **24** : 341–51.

The close dependence of wheat varieties on local conditions of climate and soil is stressed. In southern Moravia the climate is of the continental type and resistance to drought and frost are most important breeding objectives. Early ripening is important as a means of escaping the effects of summer drought and also attacks of black rust.
Two main types of winter wheat are described: (1) the continental varieties with awned, lax ears, relatively few grains per ear, good tillering, weak straw and good baking quality, and (2) types such as Squarehead, which require a relatively high rainfall and have stiff straw, large leaf surface, large well-set ears, large grain, high yield and poor grain quality. Squarehead types are not in general suited to dry, continental conditions, although one such type, Rimpau's Hybrid, has been re-selected and distributed in parts of Moravia.
By crossing wheats of the above two groups, various intermediate types have been derived. Some of the above characters are found to be linked, e.g. early ripening and good grain quality with weak straw, and it is very difficult to get desired recombinations.
The wheat breeding work carried out at Seelowitz, near Brno, is briefly described. Jubiläumsbart [Jubilee Bearded], registered in 1928, showed high yield but was lacking in straw strength and grain quality. It was crossed with an early-ripening Russian wheat, giving Jubiläumsbart II, which resembled continental wheats in early ripening and winter-hardiness, but had a fairly dense ear and strong, short straw. In 1940 Imperialbart [Imperial Bearded] was produced from a cross (Szekacs x Non Plus Ultra) x (Excelsior x Jubiläumsbart). Two stocks were developed, No. 2336 with lax ears, medium resistance to lodging, good tillering, frost resistance and good grain quality, and No. 2036, resistant to lodging and with good tillering and grain quality, and a denser ear. Further crosses have been carried out. Beardless wheats and varieties for particular local conditions are being developed.
Spring wheats are relatively unimportant in Moravia, but some new types have been developed. Early ripening, drought-resistant forms are again required. Two wheats produced at Seelowitz from a cross between an improved land variety and Janetzkis are specially mentioned; they are Vesna II (bearded) and Lada (beardless). S. E.

1371. ARTEMOVA, A. and
JAKOVLEVA, W. 633.11:575.127.5:633.289(47)
(**Wheat-*Agropyron* hybrids in Kazahstan**).
Sovhoznoe Proizvodstvo (State Farming) 1944 : No. 8–9 : 25–26.

The wheat varieties at present grown in Kazahstan are unsatisfactory in some respects. Experiments have been conducted with perennial wheat and other hybrids of wheat and *Agropyron* species, which demonstrate several valuable properties possessed by these plants.
Thus, for example, perennial wheat No. 34085 gave a yield of 32·2 c. per ha. in 1941 and 9·6 c. per ha. in the following year, which was a year of very low rainfall. A better second year growth is obtained in areas where irrigation is practised.
Some of the spring wheats from *Triticum* x *Agropyron* crosses have proved more resistant to yellow rust and smut than the standard variety Graecum 283 and have given higher yields in consequence.
Results from the collective farms also show the superiority of the hybrids, both spring and winter types. I. Z.

1372. WHITNEY, D. E.,
HERREN, H. and
WESTERMAN, B. D. 633.11:577.16(78.1)
**The thiamine and riboflavin content of the grain and flour of certain varieties of Kansas-grown wheat.**
Cereal Chem. 1945 : **22** : 90–95.

An analysis was made of thiamin and riboflavin content in six varieties from the 1941 crop, viz. Turkey, Chiefkan, Blackhull, Pawnee, Comanche and Tenmarq. The same varieties were analysed from the 1942 and 1943 crops with the addition of Nebred and the hybrid Blackhull x

Tenmarq respectively. Varietal differences were observed in the thiamin content of the wheat samples and in the retention of thiamin in the flour. The 1941 and 1942 samples showed no varietal variation in riboflavin. Some varietal differences were observed in the flour from the 1942 and 1943 samples.

1373. Fifield, C. C. *et al.* 633.11:581.6(73)
**Quality characteristics of wheat varieties grown in the western United States.**
Tech. Bull. U.S. Dep. Agric. 1945 : No. 887 : Pp. 35.

This bulletin gives the results obtained in a comprehensive study of protein content and other characteristics of quality of 44 winter and spring varieties.

1374. Finney, K. F. 633.11:581.6(73)
**Methods of estimating and the effect of variety and protein level on the baking absorption of flour.**
Cereal Chem. 1945 : **22** : 149–58.

The effect of variety and protein level on the baking absorption of flour has been investigated in 10 pure hard wheats.

1375. Miller, E. G.,
Gauch, H. G. and
Gries, G. A. 633.11–1.557:581.46(78.1)
**A study of the morphological nature and physiological functions of the awns of winter wheat.**
Tech. Bull. Kans. Agric. Exp. Sta. 1944 : No. 57 : Pp. 82.

The effect upon yield of removing the awns has been studied in several varieties.

1376. Saltykovsky, M. I. and
Sapryguina, E. S. 633.11–2.111:575"793":575.12(47)
**A method for increasing winterness in wheats.**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1944 : **45** : 349–52.

Winter habit in hybrids has been found to depend upon the period of vernalization and the light stage of the parental varieties. A study has been made of winter habit in the $F_3$ and $F_4$ generations of hybrids between spring and winter wheats. In hybrids between the early spring wheats, Prelude and 25183, and various winter wheats, segregation was observed of types of winter habit ranging between those of the two parents. In hybrids from crosses between very late spring and winter wheats, a wide diversity of forms segregated, and transgression types appeared with a vernalization period longer than that of the parental winter wheat. Variation in winter habit and hardiness showed a marked parallelism.

1377. 633.11–2.111:581.1:575(48.5)
Andersson, G. 633.14–2.111:581.1:575(48.5)
**Gas change and frost hardening studies in winter cereals.**
Håkan Ohlssons Boktryckeri, Lund 1944 : Pp. 163.

The varieties studied, Sangaste and Petkus rye, and Sammet, Sol III and Wilhelmina wheat, have shown considerable differences in frost resistance and in various characters related to hardiness. A hardier variety has shown a higher assimilation and respiration rate under conditions of hardening than a less hardy one. The ability to reduce the respiration rate in darkness or poor light, and thus retain sugar as long as possible, has also been found to be a varietal character closely correlated with hardiness. Varietal differences exist in the degree of growth inhibition during winter. The complexity of frost resistance is discussed, together with the effect of selection and breeding. In most hardy varieties the different constituents are combined, but experimental results have shown that certain constituents may occur separately or to a highly developed degree. The ability to separate the different constituents of hardiness, such as assimilation intensity at low temperature, inhibition of growth, etc., is considered to be of great value in practical breeding work.

1378.

633.11–2.4–1.521.6:575(43)
633.13–2.451.2–1.521.6:575(43)
633.16–2.4–1.521.6:575(43)

ROEMER, TH.

Ausgangsmaterial für die Resistenzzüchtung bei Getreide. Ergebnisse 20 jähriger Arbeit der Pflanzenzuchtstation Halle a. S. (**Initial material for breeding cereals for disease resistance. Results of 20 years' work at the Halle Plant Breeding Station**).
Z. Pflanzenz. 1941 : **24** : 304–32.

**Wheat**

In spring wheat, resistance to 10 races of yellow rust (*Puccinia glumarum*) has been sought. The variety 1014/27 (Strube's Squarehead x Noé), resistant to races 9 and 1, has proved valuable in crosses with varieties resistant to race 2. From such a cross (1014/27 x von Rümkers Sommerdickkopf), a spring wheat 4858/37 resistant to all 10 races of rust has been developed. The Canadian variety Garnet has proved resistant to all 10 races, and Peragis x Garnet shows even greater resistance. Certain varieties of *Triticum Spelta* are also valuable in this connexion.
The Chinese winter wheats 165 and 166, exceptionally early ripening but lacking in other qualities, are resistant to yellow rust. Their hybrids need to be back-crossed to improve their quality. Ridit and Thatcher have proved valuable, and variety 3330/32 (Ridit x Panzer III) is resistant to all races of yellow rust, is winter-hardy and resistant to bunt, but very susceptible to black chaff (*Bacterium translucens*). The crosses between Thatcher and Kronen, Heine IV and Carsten V have good baking quality, resistance to yellow rust and in some cases to *P. triticina*, but they are characterized by a reduced yield and need to be back-crossed. A very promising variety, 7666/37, has been raised from a cross between Thatcher and a spring wheat.
Full resistance to the 6 races of *Puccinia triticina* of importance in Germany could not be found in any native variety. Varieties with valuable field resistance, which were used as parents, included 38MA and Sin Rival (both Argentina), Marquis, Reward, Hope and H44. Hope showed resistance also to loose smut, black stem rust, a limited resistance to mildew, and good baking quality, but was very susceptible to black chaff. The yield of crosses between Hope or H44 and German varieties was very poor. Selections of Ceres x (Hope x Florence) and H44 x Thatcher made by Stakman have all the useful qualities of Hope, but with higher yielding ability and very early ripening. Hope x 4453/31 gave good results but insufficient yield; back-crosses are contemplated.
Seedling resistance to *P. triticina* was ascertained in a few cases only. Strampelli's variety Ardito and the French variety Aurore showed seedling resistance to many races, but neither was winter hardy and they were therefore crossed with spring wheats. The hybrids are highly resistant to *P. triticina* but of poor baking quality. They have been used in further crosses. A list of *durum* wheats resistant to *P. triticina* is given.
Very little resistance to mildew (*Erysiphe graminis*) was found in a test of 800 varieties and a large collection of European land wheats. A few kinds showed field resistance only. For full resistance Persian Black (*T. persicum*) or certain *T. durum* varieties could be used, and a useful amount of resistance may be obtained by using Vilmorin's variety Normandie; this is susceptible only to a few rare races of the fungus; it is weak-strawed and bearded.
The above are spring wheats. Mildew resistance in winter wheats has been found in forms collected by the Hindu Kush expedition of 1935. Three varieties were highly resistant but not sufficiently winter hardy. It is planned, therefore, to cross resistant spring wheats with susceptible winter forms, picking out resistant, winter-hardy segregates in the $F_3$ and $F_4$.
Wheats resistant to races 1 and 2 of loose smut (*Ustilago*) have been bred. Peragis is resistant to race 1, Hohenheimer 25f to race 2. From the cross of these two varieties, the resistant line 3890/30 was developed. Some lines of this cross also showed resistance to the more virulent race 3, a lucky case of transgressive segregation. This condition was also found in certain other crosses, e.g. with Heines Kolben and with Marquis. The most valuable breeding material, however, is considered to be Hope, H44, Thatcher and their derivatives, in view of their valuable qualities in addition to resistance to the three races of loose smut.
Tests for reaction to bunt (*Tilletia*) showed that the winter varieties Hohenheimer Dickkopf 77, Heils Dickkopf, Fürst Hatzfeld and Tubeuf were resistant, but they subsequently proved susceptible to collections of bunt spores from various origins. American varieties have been of most value, notably Ridit, Oro, Martin, Minturki, Oro x (Turkey x Florence), Jenkin x Ridit and crosses of Hohenheimer Dickkopf 77 with Turkey, Hussar and Ridit. Ridit has been much used

as a parent, e.g. in crosses with Panzer III, Kronen and Kirsches Stahlweizen 44/26. Useful material for further crosses has been obtained.
A useful table of wheat varieties used as parents is given, together with their reaction to diseases, and other economic characters.

**Oats**
Very few varieties proved resistant to loose smut (*Ustilago Avenae*). These included Jeanette O, Black Mesdag, Buddah, La Estanzuela, Markton, Navarro, a Turkish oat and varieties of *Avena byzantina*. Black Mesdag proved the most useful parent. A series of crosses with high-yielding German varieties gave resistant segregates with yields 5–15% below that of the high-yielding parents. These segregates were crossed again with high-yielding types, giving a series of forms combining high yield and smut resistance with early, mid-season and late ripening, white and yellow grain, and tall and short straw.

**Barley**
Honecker's mildew-resistant barleys are resistant only to races 2 and 8 of barley mildew. The U.S. variety Gopal is resistant to all 8 races but is considered unsuitable for breeding purposes. The 2-rowed wild barley *Hordeum spontaneum* var. *nigrum* is resistant to all but race 6 and might be a valuable parent if back-crossed repeatedly to cultivated forms. Three spring barleys obtained from the Lyallpur experimental station proved to be completely resistant to mildew and also to leaf stripe (*Helminthosporium*). Two of the three are also resistant to loose smut. They therefore have a 3-fold resistance of very great value.
Japanese 4-rowed barleys nearly all proved resistant to *Helminthosporium*. Nepalese hooded barley was resistant to leaf stripe and loose smut, but will not be used further in view of the greater usefulness of the Lyallpur types.
For the production of resistant winter barleys, smut-resistant Japanese spring barleys with strong straw have been crossed with Friedrichswerther, Mahndorfer and Kalkreuther winter barleys, and from the progenies smut-resistant types equivalent to Mahndorfer in winter hardiness have been obtained. Several winter barleys have also been crossed with 2646, a smut-resistant derivative of the cross Heils Franken x Walpersii. S. E.

1379. Yu, T. F.,
Wang, H. R. and
Fang, C. T. 633.11–2.451.3:576.16:631.521.6(73)
**Varietal resistance and susceptibility of wheat to flag smut (*Urocystis tritici* Köern.). IV. Further studies on physiologic specialization in *Urocystis tritici* Köern.**
Phytopathology 1945 : **35** : 332–38.
On the basis of their pathogenicity on four differential varieties of *T. vulgare*, Nanking No. 716, Grassland, Ngochen and Tsiang Hua No. 1932, and one variety of *T. turgidum*, Tsiang Hua No. 559, 12 physiological races of flag smut have been determined in China.

1380. Vallega, J. 633.11–2.452:576.16:631.521.6(82)
Reacción de algunos trigos con respecto a las razas fisiológicas de *Puccinia rubigo-vera tritici*, comunes en Argentina. (**Reaction of certain wheats to the physiological races of *P. rubigo-vera tritici* common in Argentina**).
Rev. Fac. Agron. B. Aires 1944 : **11** : 91–115.
The variety 38 M.A., which used to be the most popular variety in Argentina, was resistant to *P. rubigo-vera* but the new varieties that are replacing it are mostly susceptible. Races 20 and 49, together with 13 and 26(?), are the most common and the variety Sinvalocho is resistant to all of them. Certain other races, to which Sinvalocho is not resistant, are however also present, including the highly virulent races 57 and 114.
The literature on resistance to this rust is reviewed. None of the varieties at present cultivated in Argentina is resistant to all races. An examination of the behaviour of the varieties indicates that most of the resistant ones have acquired their resistance to races 20 and 49 from the parent I.F.L.E.7d (from La Estanzuela); resistance to race 5 from 7d and Lin Calel; to race 62 from San Martín and to races 57 and 114 from 7d, Favorito and Lin Calel.
Selection I.F.L.E.7d and Renacimiento are resistant to all races but 62; resistance to race 62 occurs in Favorito and to a certain extent also in certain varieties such as Klein 42 and Vencedor

[Victor], whose parents are susceptible. Titán, a descendant of I.F.L.E.7d, is moderately resistant to race 62 and resistant to all the others. The best hybrid so far is one from Progreso x Apulia, which is resistant to all races that occur in Argentina. The variety 12H3 Percival also confers on its hybrids almost complete resistance to all races. Hybrids of Riccio and Democrat x Lin Calel are resistant to all the common races. Several hybrids are indicated as possessing resistance to one or other group of races. Some possess mature plant resistance and some varieties classed as susceptible usually escape infection in the field.
*Triticum durum*, *T. dicoccum* and *T. turgidum* showed very variable reactions in their different varieties. The variety Chaucho Ovalle of *T. turgidum* was resistant to all races, including those isolated in Chile. *T. Timopheevi* and *T. monococcum* also proved resistant to all races.

1381. Stakman, E. C.,
Levine, M. N. and
Loegering, W. Q. 633.11–2.452:576.16:631.521.6(73)
**Identification of physiologic races of *Puccinia graminis tritici*.**
Agric. Res. Admin., Bur. Entomol. Plant Quar., U.S. Dep. Agric. 1944 : No. E-617 : Pp. 27. (Mimeographed).
This identification key includes 189 races, and is based upon their pathogenicity on twelve differential varieties of *Triticum* species. The concepts of race and biotype are discussed.

1382. Becker, H. 633.11–2.452:576.16:631.521.6:575
Ergebnisse und Erfahrungen bei der Resistenzzüchtung gelbrostwiderstandsfähiger Weizen. (**Results and experiences in breeding wheats resistant to yellow rust**).
Z. Pflanzenz. 1942 : **24** : 539–68.
A comprehensive review is given of recent work in breeding wheat for resistance to yellow rust. The countries considered are France, Germany, Holland and Sweden, special attention being paid to the findings of the plant breeders of Halle. The importance of distinguishing between field and seedling resistance is emphasized, also the necessity of concurrent open-air and greenhouse investigations. Consideration is given to the different conditions obtaining in the four countries mentioned, climatic differences and the variation in the types and proportions of the physiological races of the pathogen being treated at length. As a result of her findings, the authoress estimates the relative importance of the several factors involved in breeding for rust resistance and discusses appropriate methods for continuing such studies in the future.

1383. Chu, Vong-May 633.11–2.6–1.521.6(51)
**The prevalence of the wheat nematode in China and its control.**
Phytopathology 1945 : **35** : 288–95.
Out of a considerable number of varieties and strains tested for resistance to nematode attack over a period of six years in different regions, only five showed little or no infection, viz. P.C.876, P.C.690, P.C.633, P.C.171 and Hsuchow Resistant No. 2. The yields of the first three strains have been found to be as good as or even better than those of commercial varieties. These strains are, however, late maturing, a disadvantage when the fields have subsequently to be planted to rice.

1384. 633.11.00.14(77.3)
**Yields of winter wheat 1943-44.**
Circ. Univ. Ill. Agric. Exp. Sta. 1945 : No. 588 : Pp. 4.
Varieties are recommended for sowing in Illinois. Tables are given which include data on bread-making quality, resistance to lodging and reaction to mosaic.

## BUCKWHEAT 633.12

1385. Sakharov, V. V.,
Frolova, S. L. and
Mansurova, V. V. 633.12:576.356.5:581.04:575(47)
**Autotetraploidy in different varieties of buckwheat (*Fagopyrum esculentum*).**
C.R. (Doklady) Acad. Sci. U.R.S.S. 1945 : **46** : 79–82.
A description is given of colchicine-induced tetraploid forms of nine varieties (cf. *Plant Breeding Abstracts*, Vol. XV, Absts 971 and 972). Very wide variation was found between different

varieties and within a single variety with regard to fertility. True breeding tetraploids giving high seed sets of good quality have been obtained in the varieties Kharkovskaya, Altaskaya and Burgata-Mongolskaya. In the variety Kazanskaya, seed weight was poor and fertility somewhat low. The varieties Spanish Silvery, Bogatyr, BTSHA and Belorusskaya showed a very low fertility.

## OATS 633.13

1386. 633.13:575"793"
KORNILOV, A. 633.171:575(47)
**(Two crops a year).**
Sovhoznoe Proizvodstvo (State Farming) 1944 : No. 7 : p. 34.

The Karaganda station is situated in a part of Central Asia where growth conditions are difficult, but irrigation can be practised. The purpose of this short article is therefore to explain how to grow two crops in one year, or three in two, by sowing oats, millet, rye and peas. To facilitate the fulfilment of this aim, the station has bred a hybrid oat, Dolinskiĭ No. 16, which is derived from Lochow and *Avena byzantina* No. 4636. It is earlier than Lochow by six days, and exceeds it in yield by 12%. The station has also bred six new varieties of millet which can be grown much further north than other varieties, and can be sown as catch-crops under hard conditions. Two varieties of millet, Dolinskiĭ 3097 and 5085, are described. I. Z.

1387. WERTH, E. 633.13:576.16(43)
Der Hafer, eine urnordische Getreideart (Zur Geographie und Geschichte der Kulturpflanzen und Haustiere XXV). [**Oats, a proto-nordic cereal species. (The geography and history of cultivated plants and domestic animals. XXV)**].
Z. Pflanzenz. 1944 : **26** : 92–102.

An account is given of the history of oat cultivation in Europe, special attention being paid to the intrageneric and intraspecific variation of the genus *Avena* and to various archaeological and anthropological conclusions which are believed to demonstrate that cultivated oats are a product of the "nordic" culture of north-western Europe. It is believed also that the same culture introduced the practice of adding the leaves of *Myrica Gale* to beer brewed from oats, the forerunner of the present usage of adding hops.

1388. KEESE, H. v. 633.13:581.6:578
Kann die Methode des Gefässversuches zur Prüfung der Leistungsfähigkeit neuer Getreidezüchtungen herangezogen werden? (**Can the method of pot experimentation be adopted for testing the efficiency of new cereal breeding lines?**).
Z. Pflanzenz. 1944 : **26** : 199–213.

Comparative tests have been made of the grain and straw yield, crude protein, digestible protein and pure protein content of the grain, efficiency of nitrogen assimilation, grain content of vitamin B, and the ratios between these various characteristics, of the five oat varieties Flämingsgold (Fläming's Gold), Flämingstreue (Fläming's Loyalty), 21,36, 86 37 and Heines Silberhafer (Heine's Silver). The varieties were grown in pots under regulated conditions of soil water supply and soil content of nitrogen, phosphorus and potassium. The results are believed to justify the adoption of this technique for varietal comparisons.

1389. ROSEN, H. R. 633.13–2.452:581.192(76.7)
**Incidence of crown rust of oats from October to March, 1944-45, in Arkansas.**
Plant Dis. Reporter 1945 : **29** : 286–87. (Mimeographed).

Data have been obtained indicating that in any plot where crown rust infection is abundant, the percentage of crude protein of the plant is relatively high and tends to give an artificial value to the protein content of the variety concerned. No significant varietal differences were however found in protein content.

1390. ROSEN, H. R. 633.13–2.452:576.16:631.521.6:575.12(76.7)
**Breeding oats to combine resistance to race 45 and other races of crown rust common in Arkansas.**
Phytopathology 1945 : **35** : 143–44.

Race 45 of *P. coronata*, first detected in Arkansas in 1937, has occurred abundantly during the

1944 season. Varieties of Bond or Victoria parentage have shown susceptibility to race 45. A hybrid, No. 674 (2)-39f, has been produced with a high degree of resistance to race 45 and also to races 1 and 7, and several less common races in Arkansas. It has been derived from a cross between Mutica Ukraina and R3–II, the first-named being immune to race 45. The parentage of R3–II is Coker 32–1 x (Victoria x Richland C.I. 3313).

1391. Atkinson, R. E. 633.13–2.8–1.521.6(75.6+75.7)
**A new mosaic chlorosis of oats in the Carolinas.**
Plant Dis. Reporter 1945 : **29** : 86–89. (Mimeographed).

Observations have been made of the reaction of varieties at different locations to a mosaic chlorosis first observed in 1944.

## RYE 633.14

1392. 633.14:575.127.5:633.11
Zwoboda, A. 633.14–2.111–1.521.6:575.127.5
Eine spontane, fertile Artkreuzung. (**A spontaneous, fertile, interspecific cross**).
Z. Pflanzenz. 1941 : **24** : 339–40.

In a culture of a wheat x rye x wheat hybrid, resembling wheat in appearance, a plant was found which resembled the $F_1$ of wheat x rye. This plant produced two grains after open pollination, and one daughter plant was raised to maturity. This resembled rye and was fertile. The author considers it to have been the product of two successive natural crosses of the original hybrid with rye. The next generation, raised in 1939/40, proved to be more winter hardy than either wheat or rye. S. E.

1393. Cicin, N. V. 633.14:575.127.5:633.289(47)
**(Prospects of breeding winter hardy forms of winter crops).**
Vestnik Akademii Nauk S.S.S.R. (Record of the Academy of Sciences U.S.S.R.) 1944 : No. **3** : 116–22.

The existing rye varieties are insufficiently hardy for cultivation in Siberia and Kazahstan. Omka rye, produced by the author by repeated selection, is the hardiest form yet known, but is still liable to a loss of up to 30% in severe winters.

Attempts were made to cross rye with *Agropyron glaucum*, *A. elongatum* and *A. junceum*. An average of 0·9% set was obtained. The hybrids produced were intermediate in most other characters but were perennial and exceeded the *Agropyron* parent in hardiness. They were very vigorous and produced up to 150 normal ears per plant. They were immune to rust and mildew but were attacked slightly by ergot. Hybrids with *A. elongatum* produced a certain proportion of pollen grains of normal appearance, but no seed was set when the hybrids were used to pollinate winter rye, nor when the hybrids were pollinated one with the other.

In attempts to overcome the sterility of the $F_1$ hybrids, back-crosses were made under all possible conditions of weather, times of day, and periods of the month, in 4 consecutive years; 66,213 florets were pollinated and 14 grains were produced; only 3 of them gave rise to normal plants.

More complex crosses have also been carried out; for instance, wheat x rye hybrids have been pollinated with *Agropyron*, *Triticum* x *Agropyron* hybrids with rye, and *Secale* x *Agropyron* hybrids with winter wheat. The wheat x rye hybrids pollinated with *A. glaucum* gave a 3% seed set and the grains germinated well. On pollinating $F_2$ *Triticum* x *Agropyron* hybrids with winter rye, a 4–5% set was obtained, the grains having a germinating capacity of 80%.

1394. Nagao, M. 633.14:576.312.35:576.356(52)
**(An idea on the question of the chromosome number in rye).**
Agric. Hort. 1937 : **12** : 817–22.
[From Jap. J. Bot. 1938 : **9** : p. (59) : Abst. 224].

The work of various authors has shown that haploid cells with 7 and 8 chromosomes occur in rye, the 8-chromosome cells being attributed by some investigators to the production of an extra chromosome by a transverse break.

The author followed the reduction division in PMC in rye with $2n = 16$ chromosomes, and concluded that the hypothesis of the transverse breaking of the chromosome should be re-investigated.

1395. FLEISCHMANN, R. 633.15:575(43.91)
33 Jahre Maiszüchtung. **(33 years' maize breeding).**
Z. Pflanzenz. 1941 : **24** : 363–73.

The author's experiences in maize breeding in Hungary are summarized. A table showing the gradual improvement of the Kompolt variety of maize from 1922 to 1940 is given; yield, thousand corn weight and shelling percentage have all been increased.

The main morphological characters to be sought when breeding maize for very dry conditions are listed. They include rapid germination and seedling development, absence of side tillers, strongly ribbed leaves, hairy leaf sheath, much-branched tassels producing a large quantity of pollen, low placing of the cob on the stem, low number of nodes, a single cob per plant and also resistance to smut. Cobs with 16 rows of grains are considered ideal, except in Southern Hungary, where 18 rows are preferred.

Experiments with heterosis breeding have been carried out and a type developed which is good for silage. Crosses with *Euchlaena mexicana* have also been made, and a hybrid produced which is a valuable fodder maize for dry conditions. This type is susceptible to smut and contains a small proportion of sterile plants, faults which are being remedied.

The technique of saving seed so as to retain a high germination percentage is discussed. S. E.

1396. 633.15:575(77.7)
**Report on agricultural research for year ending June 30, 1944.**
Rep. Ia Agric. Exp. Sta. 1944 : Pt II : Pp. 92.

**Maize**

An outline is given of the development of hybrid maize in Iowa. In 1943 farmers in Iowa harvested at least 128 million additional bushels as a result of using hybrid seed. Future fields of improvement are indicated. These include the development of strains with higher protein content, and of special types for various industrial purposes, and the improvement of waxy corn, the acreage and commercial use of which show a rapid increase.

Methods of testing new inbreds which have been used since 1939 are described. The top-cross test is largely employed for the early evaluation of general combining ability. An investigation has been made of the various factors affecting the yield of synthetic varieties. The yield was found to be at a maximum when only five to six inbreds are combined, in contrast to the usual assumption that the yield increases directly with the number of lines involved.

All the varieties so far tested, including some Mexican strains and crosses of these with inbred lines of the Corn Belt, have shown a uniformly high susceptibility to *Ustilago Zeae*. A study has been made of disease resistance among native and exotic types of maize and related Andropogoneae.

An investigation of stem and root development in single crosses and their component inbreds has been made, to obtain further information on hybrid vigour. The length and volume of the hybrid embryos were greater than those of the inbred embryos. The lengths of the formative periods of the hybrids and the parent inbreds were compared, the formative period being defined as the period from the date of planting to the stage of development in which the apical meristem begins to form the tassel and ceases to produce the various stem structures. In all months this period was shorter in the hybrids than in the inbreds. During May, the usual time of planting, when temperature conditions are not optimum for growth, both inbreds and hybrids are measurably stunted. It is suggested that the introduction of hybrids with a lower temperature and possibly a lower light optimum for growth would be likely to increase yields. A fair degree of correlation exists between size of stems and number of leaf veins; it is possible that the number of veins may serve as a basis for predicting yields. The inbreds L 289 and Os 420 were not greatly inferior in vigour to the single crosses into which they entered as one parent.

Linkage data have been obtained for the characters sugary endosperm, *su*, glossy seedling, $gl_4$, and tunicate ear tassel, *tu*. The mutant character "accessory blade" (*ab*) in seedling leaves is described. The effect of colchicine upon the newly formed leaf primordia and marginal leaf meristems of seedlings has been studied.

The inheritance of earliness was studied in hybrids from crosses between early and late inbreds. Dominance of earliness was observed.

Attempts are being made to produce inbred lines of waxy corn having a more satisfactory chemical composition with regard to water and soluble constituents. Tetraploid starchy and waxy stocks are being developed for further genetic analyses of starch properties.

A preliminary analysis of 70 inbred lines for protein and oil content has been made for use in studies of the inheritance of these constituents.
An analysis of carotenoid pigment in the leaf tissue of inbreds, single and double crosses, is in progress. Silages from the Ohio hybrid No. 94 and the U.S. hybrid No. 13 showed no important differences in carotene content.
Statistical analysis of yield data indicates that the differences in yield due to various methods of spacing are not significant, but that the relation between the number of plants per acre and the yield is significant.

**Sweet corn**
Cross-pollinations were made involving golden inbreds, and inbreds of Country Gentleman and Evergreen.

**Pop corn**
White and yellow hybrids are to be selected for commercial use. Open-pollinated samples from widely scattered sources have been obtained as a source of inbreds. Experiments are in progress to obtain improved inbreds by the pedigree method, and by outcrossing certain inbreds and subsequent back-crossing and selfing.

1397. 633.15:575"793"(73)
635.52:581.143.26:575(73)

**Items.**
Science Suppl. 1945 : **101** : p. 10.

The Connecticut Agricultural Experiment Station has developed a "succession series" of maize hybrids, which, if planted simultaneously will bear cobs continuously from early summer to autumn.
A new lettuce variety, Slobolt, resistant to bolting has been bred by R. C. Thompson at the Plant Industry Station, Beltsville, Md.

1398. Kinman, M. L. and
Sprague, G. F. 633.15:575.12(73)
**Relation between number of parental lines and theoretical performance of synthetic varieties of corn.**
J. Amer. Soc. Agron. 1945 : **37** : 341–51.

Yields actually obtained from inbred lines and the $F_1$ and $F_2$ of 45 single crosses between them were compared with yields predicted on the assumptions of arithmetic and geometric gene action. The data indicate that the assumption of arithmetic gene action gives a closer approximation between calculated and observed yields. The data show that in general the number of lines which will give the highest yield in synthetic combination varies with the range in combining ability among the inbred lines available. On the basis of the present study four to six lines appeared to be the most efficient number. Synthetics made up of inbred lines combined directly may be expected to be superior to those produced by combining the same lines as top-crosses. A discussion is given of the uses of synthetic varieties.

1399. Reiss, F. and
Robinson, J. L. 633.15:575.12(77.7)
**The 1944 Iowa corn yield test.**
Bull. Ia Agric. Exp. Sta. 1945 : No. P71 : 372–416.

Data are reported for yield, stand, dry matter content, root and stalk lodging, height of ear, dropped ears and damaged grain, of various hybrids grown in different parts of Iowa.

1400. Clapp, A. L.,
Heyne, E. G.,
Davis, C. D. and
Scott, W. O. 633.15:575.12(78.1)
**Kansas corn tests, 1944.**
Bull. Kans. Agric. Exp. Sta. 1945 : No. 325 : Pp. 35.

A report is given of the results of tests of open-pollinated varieties and hybrids in Kansas during 1944 and of tests held during the past six years.

1401. Andres, J. M. and
Saura, F. 633.15:576.356.5:581.036.1
Maíces argentinos tetraploides obtenidos por tratamiento con calor. (**Tetraploid Argentine maizes obtained by heat treatment**).
Rev. Fac. Agron. B. Aires 1944 : **11** : 17–30.

Three tetraploid plants were found among 1390 seedlings of ears of the variety Colorado Klein treated for 45 minutes at 45° C., and one among 360 seedlings from the same variety treated at 47° C. Two further tetraploids were obtained from other lots treated at 45° C. All six tetraploids had larger stomata, pollen grains and stigmata than the diploids.

The pollen fertility was equal or almost equal to that of the diploid; the set of grain was however much inferior, though the grains were larger.

The tetraploid plants contained 40 somatic chromosomes and formed frequent quadrivalents at meiosis; many dyads were formed, which accounts for the high proportion of fertile pollen.

The tetraploid plants had thicker and more coriaceous leaves than the diploids, and tests were made of their resistance to locust (*Dichroplus* sp. and *Chromacris miles*). No difference was observed in severity of attack between diploid and tetraploid plants. The tetraploids were also found to be more susceptible to drought and sun injury.

1402. Shank, D. B. 633.15:581.02:575.12(73)
**Effects of phosphorus, nitrogen, and soil moisture on top-root ratios of inbred and hybrid maize.**
J. Agric. Res. 1945 : **70** : 365–77.

An investigation has been made of the response of inbred lines and $F_1$ hybrids with genetically different shoot root ratios to different controlled concentrations of phosphorus, nitrogen and soil moisture.

In all the tests the hybrid shoot root ratios differed slightly or not at all from those of the parents with lower ratios, whatever the ratios of the inbred parents. Shoot root ratios increased with phosphorus concentrations, but did not increase as rapidly for all the hybrids or those inbreds with low ratios, as for inbreds having high ratios; a physiological explanation of this result is given. Shoot root ratios increased with an increase in nitrogen or soil moisture concentration, but for each factor, no differential rate of increase was found between hybrids and their parents with either low or high shoot root ratios.

1403. Haagen-Smit, A. J.,
Siu, R. and
Wilson, G. 633.15:581.3:578.08
**A method for the culturing of excised, immature corn embryos *in vitro*.**
Science 1945 : **101** : p. 234.

Maize embryos 0·3 to 3 mm. in length have been grown *in vitro* using the method described by Overbeek *et al.* for *Datura*. The embryo factors, however, believed to be present in coconut milk are not required.

1404. Wiidakas, W. 633.15–2.7–1.521.6:575.12(78.4)
**Planning the fight against the European corn borer in the north central states.**
Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1945 : **7** : No. 4 : 29–31.

At a conference recently held at Purdue University, Indiana, to discuss the problem of the European corn borer, which is spreading to further areas, various recommendations were put forward for its control. Among them was the suggestion that a synthetic variety involving 10–14 inbred lines with resistance to borer attack should be produced to fill the need of borer resistant varieties and as a source from which to select new borer resistant lines.

## BARLEY 633.16

1405 Vinogradova, N. M. and
Pisarev, V. E. 633.16:575.127.2(47)
(**Hybridization of cultivated barley with wild barleys**).
Vestnik Akademii Nauk S.S.S.R. (Record of the Academy of Sciences U.S.S.R.) 1944 : Nos 4–5 : 65–66.

In crosses of *Hordeum vulgare* x *H. nodosum* no seed was set from 650 florets pollinated, whereas

303 florets in the reciprocal cross produced 71 grains. Similarly in crossing *H. vulgare* x *Critesion jubatum* (= *H. jubatum*), no seed was set from 1210 florets pollinated, while the reciprocal cross gave 101 hybrid grains from 350 florets pollinated.
Most of the hybrid plants died before reaching maturity and the only mature $F_1$ plants obtained were five from *H. nodosum* x cultivated barley and two from *C. jubatum* x cultivated barley. All had defective anthers and were sterile. Pollination of the former group of hybrids with cultivated barley gave only seven grains from 1754 florets, and of the latter group two grains from 383 florets.

1406. Chen, Shao-lin,
Shen, Shu-min and
Tang, P. S. 633.16:576.356.5:581.04
**Studies on colchicine-induced autotetraploid barley. I and II. Cytological and morphological observations.**
Amer. J. Bot. 1945 : **32** : 103–06.
An account is given of the cytology and morphology of families derived from tetraploid seeds obtained by means of the colchicine technique. The following types of offspring were discovered: (1) diploid reversions; (2) forms in which the chromosomes fuse into a mass of chromatin during meiosis; (3) plants producing both diploid and haploid gametes; (4) forms in which the chromosome number ranges from 24 to 30; (5) autotetraploids producing multivalents at meiosis; and (6) autotetraploids giving rise to bivalents.

1407. 633.16:581.46:575.11
Tavčar, A. 633.16:575.116.1
Beitrag zur Vererbung der Spindelbrüchigkeit bei einigen Nacktgersten. (**Contribution on the inheritance of brittle rachis in some naked barleys**).
Z. Pflanzenz. 1941 : **24** : 333–38.
Forms with a brittle rachis were found in *Hordeum sativum* vars *nudum* and *coeleste*. They were crossed with various hulled barleys with a tough rachis. The brittle rachis was found to be determined by two complementary genes, $Bt_1$ and $Bt_2$. These segregated independently of the genes *Vv* (2-row *v.* 6-row) in chromosome I, *Nn* (hulled *v.* naked) in chromosome III and the gene for aleurone colour in chromosome IV. One of the *Bt* genes was linked to the gene *B* (palea colour) in chromosome II with 26·5% crossing-over.
Most of the hulled barleys with tough rachis had one only of the *Bt* genes. In one case a bifactorial segregation was obtained, which was apparently due to the segregation of a *Bt* gene and an inhibitor *X*. S. E.

1408. Åberg, E. and
Wiebe, G. A. 633.16:582:001.4
**Irregular barley, *Hordeum irregulare*, sp. nov.**
J. Wash. Acad. Sci. 1945 : **35** : 161–64.
It is recommended (1) that the epithet "*intermedium*" be restricted to apply to the subspecies of *H. vulgare* L. which is characterized by reduced lateral kernels and awnless lemmas; (2) that the term "intermediate" be used generally for describing plant characters midway between limiting types; and (3) that the Abyssinian "intermediate" barley should be segregated as a new species *H. irregulare* and be referred to as "irregular barley".

1409. Takasugi, S. 633.16:582:578.088(52)
[**The distinction which can be demonstrated between the Japanese barley races by treating their grains with carbolic acid, sulphuric acid or caustic soda solution**].
Agric. Hort. 1937 : **12** : 1101–05.
[From Jap. J. Bot. 1938 : **9** : p. (83) : Abst. 294].
A colour reaction to carbolic acid is described by which races of barley can be distinguished by their grain alone. Dorsal and ventral sides of grains may react differently.
The author's observations on different races of Japanese barley are tabulated.
The other two reagents can also be used for the same purpose.

1410. Hoffmann, W. 633.16–2.111–1.521.6:581.143.26.035.1:575.113.3
Die Vererbung der Winter-Sommer-Form und der Winterfestigkeit der Gerste. (**The inheritance of the winter-summer habit and the winter-hardiness of barley**).
Z. Pflanzenz. 1944 : **26** : 56–91.

Details are given of the growth habit, photoperiodic response, winter hardiness and type of growing point of various spring and winter barleys. Hybridization experiments were also made and have enabled the following genetical conclusions to be drawn. Growth habit is determined by a series of multiple allelomorphs, the gene *S* determining spring habit and little affected by vernalization or photoperiodic conditions; *s'*, controlling an intermediate type of behaviour giving rise to spring barley under long-day illumination and winter barley under short-day illumination, and *s*, which determines the normal winter habit. *S*, *s'* and *s* are dominant to each other in the order given and both *s'* and *s* comprise groups of subordinate alleles with slightly divergent effects; the dominance relations are affected by photoperiod. Gene *W* is an intensifying factor which enables *s* to become dominant in the presence of *S*. Final sections discuss the significance of these findings under field conditions, also the interrelation of the *Ss* and *Ww* genes with the *Di di* genes determining vegetative habit. It is important to note that the *S* allelomorphic series affects pleiotropically photoperiodic response, vernalization requirements and winter-hardiness, and that these characters therefore cannot be selected independently of each other.

1411. Honecker, L. 633.16–2.421.1:576.16:631.521.6:575.116.1
Erbanalytische Untersuchungen über das Verhalten der Gerste gegenüber verschiedenen physiologischen Rassen des Mehltaues. (*Erysiphe graminis hordei* Marchal). [**Genetical investigations on the behaviour of barley towards different physiological races of mildew (*E. g. hordei* Marchal)**].
Z. Pflanzenz. 1942 : **24** : 429–506.

An extensive study has been made of the mode of inheritance of resistance to nine races of mildew (A–J) in crosses between barley varieties.

Pflugs Intensiv is resistant to race A, resistance being monomerically determined and semi-dominant; it is susceptible to race B. Ragusa b, derived from a Dalmatian land barley, is resistant to both these races, resistance to race B being determined by a single dominant factor; its resistance to race A does not depend on the same gene as that carried by Pflugs Intensiv. The genes determining the resistance of Ragusa b to race B are not linked with the *Z* alleles affecting the number of spikelet rows.

Variety CP 103 21, derived from Criewener 403 x Pflugs Intensiv, is resistant to race D, resistance being incompletely recessive and determined moreover by the same gene as determines the resistance of Pflugs Intensiv to race A. This gene also is not linked to the *Z* alleles.

It is believed that the resistance of Ragusa b to races A and B is determined by a single major gene *B* while CP 103 21 carries a gene *d* conferring resistance to race D. The minor factors *Nek* (necrotic) and *Chl* (chlorotic), hypostatic to *B*, modify the expression of resistance in progenies derived from Ragusa b.

A modifying gene *n* (necrotic fleck) affects the degree of resistance shown by progenies derived from Ackermanns Isaria, while crosses involving Palestine C.J. 939 have led to the recognition of three further modifying factors, $P_1$, $P_2$ and $P_3$, which affect the degree of resistance shown to races A, B, C, D and H. Genes controlling resistance were also studied in crosses involving Gopal C.J. 1091.

1412. Freisleben, F. and
Metzger, I. 633.16–2.421.1–1.521.6:575.116.1
Genetische Studien zur Gerstenzüchtung. I. Vererbung und Koppelung der Mehltauresistenz und der Spindelgliedzahl. (**Genetical studies on barley breeding. I. Inheritance and linkage of mildew resistance and the number of rachis segments**).
Z. Pflanzenz. 1942 : **24** : 507–22.

The mode of inheritance of resistance to race 4 of *Erysiphe graminis Hordei* has been studied in the progeny of *Hordeum distichum* L. var. *nutans* Körn CP 127 422 x *H. vulgare* L. var. *trifurcatum* Schlecht. "Nepal". It is concluded that the first-named parent carries a gene $Er_{cp}$ incompletely dominant for mildew resistance, a gene derived from Pflugs Intensiv, which with Criewener

403 is one of the parents of CP 127 422. This gene is inherited independently of genes *V v* (row number), *N n* (type of glume envelopment) and probably of genes *B b* (glume colour) and *R r* (grain surface). It is linked with *K k* (hooded) with a cross-over value approximately 16%, which fact locates $Er_{cp}$ in the fourth linkage group.
The number of rachis segments in this cross is determined polymerically, at least two genes being involved, one in chromosome I and another in chromosome IV. The latter gene is nearer to $Er_{cp}$ than it is to *K*; the gene in chromosome I is linked to *V v*.

1413. Åberg, E. 633.16–2.484–1.521.6:581.143.26.03(73)
**Effect of vernalization on the development of stripe in barley.**
Phytopathology 1945 : **35** : 367–68.

In a study of seven varieties, vernalization has been found to favour the development of stripe, *Helminthosporium gramineum* Rabh. It is considered that it may be possible to develop a technique for testing varietal resistance on the basis of a method of vernalization.

## MILLETS AND SORGHUM 633.17

1414. Romanov, V. A. 633.171:575(47)
**(New varieties of millet).**
Bjulletenj Instituta Zernovogo Hozjaistva Jugo-Vostoka S.S.S.R. (Bull. Inst. Grain Husb. S.E. U.S.S.R.) Saratov 1944 : No. 2 : 3–5.

The panicles of millet ripen unevenly, and much seed is lost because it is easily shattered, and also because the crop is easily lodged. In their efforts to produce a variety in which those defects are absent and which yet yields abundantly, the Laboratory of Grain Crops at the Saratov Institute has bred three varieties, Kremovoe Nos 311, 55 and 68, of which No. 311 is especially noteworthy as regards not only yield, which exceeds that of the standard by 10 per cent, but also shattering of the grain, which does not occur so readily as in the standard variety. Moreover, the grains themselves are larger, and the crop ripens later. One variety can therefore be sown later than the other, thereby enabling labour to be conveniently distributed. I. Z.

1415. Karper, R. E. 633.174:575(73)
**Combine sorghums.**
Sth. Seedsman 1945 : **8** : No. 5 : 14, 24, 30–31.

A description is given of the recent development of dwarf combine types.

1416. Jones, D. L. 633.174:575(76.4)
**Texans worth knowing: Plainsman, Caprock.**
Sth. Seedsman 1944 : **7** : No. 1 : 13, 44.

The problems of the utilization of the dwarf combine types of grain sorghum are discussed. Plainsman and Caprock are combine types produced from a cross between a double dwarf kafir and a dwarf yellow milo. In tests on the Texas plains, Plainsman has yielded 35 bushels per acre, and Caprock 34. Plainsman matures earlier than Caprock and is more widely adapted. Both varieties are resistant to *Pythium* rot.

1417. Stephens, J. C. and
Quinby, J. R. 633.174:581.162.51:575.116.1(73)
**The $Ms_2$ *A* $V_{10}$ linkage group in sorghum.**
J. Agric. Res. 1945 : **70** : 209–18.

A linkage group of three pairs of genes has been investigated. The phenotypes concerned were normal and male-sterile flowers, awnless and awned lemmas, and green and virescent yellow plants, the factors being designated $Ms_2$ $ms_2$, *Aa* and $V_{10}$ $v_{10}$, respectively. In the $F_1$ the factors $Ms_2$ and $V_{10}$ show complete dominance over their respective alleles and the factor *A* almost complete dominance. Single factor segregation is indicated in the $F_2$ and back-cross populations. Since the readily observed characters, awn type and virescence, are linked with male sterility, a means is provided for the removal before pollination of normal plants from a population segregating for male sterility. The use of male sterile plants is regarded as the most feasible method so far devised for the production of $F_1$ hybrid seed on a large scale.

1418. 633.18:575(86)
CABAL MARTINEZ, E. 633.18:582
Estudio comparativo de los caracteres biométricos, agronómicos e industriales de noventa variedades de arroz. (**Comparative study of the biometric, agronomic and industrial characters of ninety varieties of rice**).
Rev. Fac. Nac. Agron., Colombia 1944 : **5** : 263–427.

This monograph on the rice plant deals extensively with the history of the crop, and its introduction into different parts of the world and into Colombia in particular. Up to 1930, four varieties were grown, namely Guacarí, the ancient local variety, Guayaquil, a variety imported from Ecuador, Japonés [Japanese] and Bomba. All were however excessively mixed and in 1930 a programme of selection of these varieties and of introduction of new ones was started. Only one out of the 40 varieties introduced from the U.S.A. was a success; this was Fortuna. This and Guayaquil soon began to degenerate and further introductions were made in 1938.
Details are given of the botany of the genus *Oryza* and the morphology of the different organs, with a very brief note on the inheritance of certain characters. Descriptions are then given of 90 different varieties; the descriptions include notes on the morphology of the plant and grain, vegetation period, disease resistance and yield. The varieties are grouped according to their place of origin. The data are also presented in tabular form.

1419. BEACHELL, H. M. and 633.18:576.356.5:581.04:581.036(73)
JONES, J. W. 633.18:576.356.5:576.356.52(73)
**Tetraploids induced in rice by temperature and colchicine treatments.**
J. Amer. Soc. Agron. 1945 : **37** : 165–75.

Naturally occurring haploid and triploid mutants in varieties and hybrids are described.
Tetraploid and tetraploid-sector plants were obtained from seed produced on panicles of the varieties Blue Rose and Caloro exposed after blooming at various temperatures. Tetraploid plants of Blue Rose were also obtained by soaking seed in colchicine. Shoots of a haploid plant, untreated and treated with colchicine, produced diploid and diploid-sector plants respectively. Tetraploid and triploid plants of both varieties were less fertile than the diploids, and had fewer tillers, coarser leaves, and larger flowers and seeds. The haploid plants were completely sterile: they tillered more freely and had finer leaves and smaller flowers than the diploids.

## FORAGE GRASSES 633.2

1420. CHIAO, C. Y. 633.2:582(51)
**Kiangsu grasses.**
Contr. Herbarium, Coll. Agric. For., Univ. Nanking 1943 : Pp. 115.

A taxonomic account is given of the grass flora of Kiangsu. About 136 species are recognized, representing 70 genera. Notes on the geographical distribution of the species in China and the vernacular names of the species are included.

1421. HARLAN, J. R. 633.2–1.531.12(73)
**Grasses of the plains.**
Sth. Seedsman 1945 : **8** : No. 4 : 12, 28–29.

Native and improved strains of grasses are described with reference to the commercial production of seed in the South-west.

1422. HARDISON, J. R. 633.2–2.4–1.521.6(76.9)
**Observations on grass diseases in Kentucky, September, 1942 to September, 1944 and a preliminary check list.**
Plant Dis. Reporter 1945 : **29** : 76–85. (Mimeographed).

Certain hybrids of *Poa arachnifera* x *P. pratensis* have shown marked resistance to leaf rust, powdery mildew and *Helminthosporium* leaf spot. The tall vigorous variety of meadow fescue, *F. elatior* var. *arundinacea*, has exhibited resistance to crown rust and a high degree of resistance to net blotch (*H. dictyoides*). Considerable variation in the reaction of individual plants of *F. gigantea* to crown rust has been observed, but satisfactory resistance does occur.

1423. BROWN, B. A. and
MUNSELL, R. I. 633.21:575.42(73)
**An evaluation of Kentucky bluegrass.**
J. Amer. Soc. Agron. 1945 : **37** : 259–67.

Strains were isolated which were significantly more productive than commercial Kentucky bluegrass, but their practical value when grown under various conditions is uncertain.

1424. Harlan, J. R. 633.262:581.162.31:575.22(73)
**Natural breeding structure in the *Bromus carinatus* complex as determined by population analyses.**
Amer. J. Bot. 1945 : **32** : 142–48.

An investigation has been made of the mode of natural variation obtaining in the *B. carinatus* complex. The existence of numerous swarms of local races has been demonstrated, also the fact that each race is highly uniform *inter se*. It is suggested that these results are owing to the cleistogamous and self-pollinating tendencies of the group. Such a breeding system would result in a number of highly homozygous families, the occasional hybrids between which would themselves give rise in a few generations to new homozygous combinations.

1425. Myers, W. M. 633.263:576.356.5
**Meiosis in autotetraploid *Lolium perenne* in relation to chromosomal behavior in autopolyploids.**
Bot. Gaz. 1945 : **106** : 304–16.

A comparison is made between the meioses of diploid and tetraploid strains of *L. perenne* L. Several types of meiotic irregularity were observed in the tetraploid material, including unequal quadrivalent disjunction, and lagging and dividing univalents at anaphase I.

1426. Zazoev, M. 633.282:575(47)
**(The breeding of Sudan grass).**
Sovhoznoe Proizvodstvo (State Farming) 1944 : No. 3 : 10–15.

Two main types of Sudan grass were met with. The plants of one were tall, with thick stems; tillering was not very vigorous, and the vegetative period was long. Those of the other were shorter, and the foliage was finer; they tillered freely; and the vegetative period was shorter. The second type was the better forage grass, for the yield was larger and the sward denser; and there was an abundant aftermath.

Both mass and individual selection were practised with success; a description of each is given, together with the observations, measurements, and analyses carried out. Two methods of hybridization are also briefly described. I. Z.

1427. Garber, R. J. and Atwood, S. S. 633.282:581.162.3(73)
**Natural crossing in Sudan grass.**
J. Amer. Soc. Agron. 1945 : **37** : 365–69.

A study has been made of the extent of natural crossing among selfed strains of Sudan grass. Tan and red pigmented strains were used, the fact that tan behaves as a simple recessive to red providing a means of determining the percentage of crossing. The amount of natural crossing was greater than has been reported for sorghum. The average percentages of crosses between tan and red plants sown near one another for the years 1941, 1942 and 1943 were 76·4, 18·2 and 34·4, respectively.

1428. Boyle, W. S. 633.288:576.354.4:582
**A cyto-taxonomic study of the North American species of *Melica*.**
Madroño 1945 : **8** : 1–26.

A cytological and taxonomic study has been made of North American representatives of the genus *Melica* L. The diploid chromosome number in each case was $2n = 18$ and few interspecific differences in chromosome configuration were observed. Interspecific hybridization occurred readily, giving vigorous but highly sterile $F_1$ hybrids. It is recommended that the genus *Schizachne* be lumped with *Melica*, and the suggestion of Skorniakov *et al.* that the genera *Melica, Schizachne, Pleuropogon, Glyceria* and *Arthocloa* be associated in a separate tribe, the Melicineae, is supported.

## LEGUMINOUS FORAGE PLANTS 633.3

1429. Schröck, O. 633.3:581.6:576.356.5
Untersuchungen an diploiden und tetraploiden Klonen von Luzerne, Gelbklee und Steinklee. (**Experiments on diploid and tetraploid clones of lucerne, black medick and sweet clover**).
Z. Pflanzenz. 1944 : **26** : 214–22.

Both tetraploid lucerne and tetraploid strains of *Medicago lupulina* have in general a greater percentage winter survival rate than the corresponding diploid strains; clonal differences are

however important. Tetraploid lines of *Melilotus albus* survived the winter less readily than diploid strains but this result was hardly significant. No correlation could be established between winter survival rate and leaf osmotic pressure, nor were significant differences detected between the osmotic pressure values of diploid and tetraploid lines.
Diploid and tetraploid lines of lucerne did not differ significantly in fresh weight, but the diploids were characterized by a greater dry weight, crude protein content and yield, and shoot number. Diploid and tetraploid strains of *Medicago lupulina* differed little in fresh weight but the former had a higher dry weight and crude protein content than the latter.

1430. 633.3–2.8:001.4
635.65–2.8:001.4
Weiss, F.
**Viruses described primarily on leguminous vegetable and forage crops.**
Plant Dis. Reporter 1945 : Suppl. 154 : 32–80. (Mimeographed).
A summary of available literature is presented. In addition to descriptions of the typical viruses occurring in the Leguminosae, notes are given of other viruses and similar diseases reported in the leguminous crops.

1431. Grandfield, C. O. 633.31:575(78.1)
**Buffalo alfalfa.**
Circ. Kans. Agric. Exp. Sta. 1945 : No. 226 : Pp. 7.
The new variety Buffalo has been selected from a strain of Kansas Common. Its wilt resistance is superior to that of standard varieties, and its resistance to other diseases is equal to that of Kansas Common. Buffalo is as good a variety for seed production as Kansas Common, and is well suited for growing in those areas to which this variety is adapted. It shows a higher stand survival than Kansas Common in the northern lucerne growing regions of the United States.

1432. Panse, E. 633.31:581.6:575(43)
Möglichkeiten der Steigerung der Eiweissleistung bei Luzerne durch Züchtung auf hohen Eiweissgehalt. (**Possibilities of raising the protein production in lucerne by breeding for high protein content**).
Z. Pflanzenz. 1941 : **24** : 229–74.
By a rapid method of determining nitrogen content, some 5300 single plants were tested for protein content in 1937, 1938 and 1939 and the figures so obtained were studied in relation to the parentage of the plants, their yield and their seed yield. Large variations in protein content were found, and from the plant breeding view-point there were no undesirable correlations with yield of green matter or seed yield. The protein content of a plant is dependent on the protein content of the stems, on the leaf-stem ratio and on the protein content of the leaves, in that order of importance. It is greatly dependent on the age of the plant, and for selection is best determined on the first cut of two or three year old plants. No consistent relationship between the protein content of élite plants and that of their open-pollinated progeny could be established. Successful selection must be based on the phenotypically best plants from the best families. Determination of protein content is essential since the forms with high protein cannot be recognized by morphological characters. J. L. F.

1433. Pohjakallio, O. 633.321–2.421.6:576.16(47.1)
Kasvinjalostusbiologisia tutkimuksia apilamädästä. (**Investigations on clover rot from the biological aspect of plant breeding**).
Suom. Tiedeakat. Esitelm. Pöytäk. 1939 (1940) : 115–28.
[From Nord. JordbrForskn. 1942 : **24** : p. 255].
A study of sexuality made from single isolated ascospores of *Sclerotinia Trifoliorum* (Erikss.) showed the fungus to be monoecious and homothallic. It might therefore be concluded that the occurrence of new physiological races would be relatively rare, which should facilitate the breeding of resistant clovers. But the possibility of mutations must also be considered and observations at Jokioinen support this assumption, where, after colchicine treatment, in apparently pure clones of *S. Trifoliorum* morphologically aberrant forms were observed.
In the Jokioinen Plant Breeding Division two methods have been used in breeding red clover for resistance to clover rot: (1) seed is taken from those strains most resistant in the plots more severely attacked by the fungus; and (2) clover strains were artificially infected with mycelium and the most resistant plants were planted out in the field and crossed *inter se.*

The breeding of more resistant red clover strains appears possible with reference to certain clover rot pathogens and within certain limited geographical areas, but the production of resistant red clover in the wider sense presents greater difficulties.

1434. Sears, O. H. and Burlison, W. L. 633.364(77.3)
**Lespedeza: its place in Illinois agriculture.**
Circ. Univ. Ill. Coll. Agric. Ext. Serv. 1943 : No. 561 : Pp. 19.
A description is given of the chief commercial varieties of *Lespedeza*.

1435. Willard, C. J. 633.366(77.1)
**Kinds and varieties of sweetclover.**
Bi-m. Bull. Ohio Agric. Exp. Sta. 1945 : **30** : No. 232 : 22–26.
Descriptions are given of varieties of biennial yellow and white sweet clover, together with the results of field tests in 1943–44.

1436. Cooper, J. F. 633.367:575(75.9)
**Sweet lupines.**
Sth. Seedsman 1945 : **8** : No. 5 : 11, 46.
Sweet strains of blue and yellow lupin have been produced at the Agricultural Experiment Station, Florida, suitable for both forage and soil improvement.

1437. 633.367:575(75.9)
**Simpson's sweet blue strain extolled by "Monticello News".**
Sth. Seedsman 1945 : **8** : No. 5 : 11, 52.
A new blue strain of sweet lupin has been developed by the Simpson Nursery Company, Florida, which can be used for both soil improvement and forage.

1438. Mirošničenko, I. 633.378:575(47)
(***Lathyrus sativus*—a high-yielding leguminous crop**).
Sovhoznoe Proizvodstvo (State Farming) 1944 : No. 4 : 29–30.
This species of *Lathyrus*, which, in the region of Krasnodar, survives spring frosts and summer drought better than any other of the leguminous seed crops, and is singularly free from pests and diseases, provides food for both man and beast. One variety of it, "Krasnodarskaja No. 55", yields seed at the rate of 23·2 centners per ha. One thousand seeds weigh 420 grm., and the crop ripens in 85 to 90 days. I. Z.

## ROOTS AND TUBERS 633.4

1439. Charetschko-Sawizkaja, H. 633.41:581.162.5
Selbststerilität und Selbstfertilität bei *Beta vulgaris* L. (**Self-sterility and self-fertility in *B. vulgaris* L.**).
*Z.* Pflanzenz. 1944 : **26** : 103–18.
Most plants of *B. vulgaris* are self-sterile, and it has been shown by the authoress that this condition arises either by a retarded rate of pollen tube growth or by the degeneration of the embryo after fertilization has been effected. Self-fertile races are known, however, also races intermediate between these and the self-sterile forms. In the self-fertile races investigated, the rate of pollen tube growth was usually the same after either open or self pollination; in one case, however, the pollen tubes developed more quickly after open pollination. Self-fertility was found not to be accompanied necessarily by a high set of seed.
The significance of these findings for genetics and breeding is considered, and notes are added on the techniques useful for determining the seed set and the degree of fertility.

1440. Murphy, E. F., Dove, W. F. and Akeley, R. V. 633.491:577.16(73)
**Observations on genetic, physiological, and environmental factors affecting the vitamin C content of Maine-grown potatoes.**
Amer. Potato J. 1945 : **22** : 62–83.
Vitamin C content has been investigated in 54 varieties. Significant varietal differences were found. The same varieties showed significant seasonal variations in vitamin C content, and from a study of 13 varieties grown in two different localities evidence was obtained indicating that

locality is a significant factor in vitamin C production. There appeared to be no relationship between vitamin C content and size or shape of tubers, eye depth, starch content or disease resistance. A limited number of analyses were made of tubers belonging to related varieties. The tendency was observed for parents high in vitamin C content to produce progeny with a medium to high content, and for parents with a low vitamin value to produce progeny with a medium to low content.

1441. Piettre, L. 633.491:581.46:581.2
Anomalies des inflorescences et des fleurs développées prématurément chez *Solanum tuberosum*. (**Anomalies of inflorescences and of prematurely developed flowers in *S. tuberosum*).**
Ann. Sci. Nat. (11e Sér. Botanique) 1939–1940 : **1** : 359–73.

Descriptions and figures are given of teratological potato inflorescences.

1442. Ratera, E. L. 633.491–1.524(82)
Ensayo de variedades cultivadas de *Solanum andigenum* Juz. et Buk., en la Facultad de Agronomía y Veterinaria de Buenos Aires. (**Test of cultivated varieties of *S. andigenum* Juz. et Buk. in the Agriculture and Veterinary Faculty at Buenos Aires).**
Rev. Fac. Agron. B. Aires 1944 : **11** : 63–77.

Observations were made on 43 forms of *S. andigenum* from Peru and northern Argentina. Data are given respecting their general development, attack by virus, fungous and insect pests, flowering and fruit formation and yield. All of them deteriorated very rapidly under the conditions of Buenos Aires and gave extremely low yields.

1443. Edmundson, W. C.,
Landis, B. J. and
Schaal, L. A. 633.491–2–1.521.6(78)
**Potato production in the Western states.**
Fmrs' Bull. U.S. Dep. Agric. 1945 : No. 1843 : Pp. 58.

The distribution of varieties in the various states is given. In the descriptions of potato diseases, notes on varietal reaction are included.

1444. Müller, K. O. and
Sellke, K. 633.491–2.7–1.521.6:575(43)
Beiträge zur Frage der Züchtung kartoffelkäferwiderstandsfähiger Kartoffelsorten. (**Contributions to the problem of breeding potato varieties resistant to Colorado beetle).**
Z. Pflanzenz. 1941 : **24** : 186–228.

A comprehensive review is given of the work done by French and German workers since Trouvelot's original discovery of the resistance of *Solanum demissum*.

The methods of testing resistance are reviewed and it is concluded that valid estimates are obtained from tests in which larvae are placed on detached leaves in small hygrostats. These estimates agree with those obtained from feeding experiments on uncut plants and are not seriously affected by the turgor or wilting of the leaves; they are related to the results obtained in the field, since there is a positive correlation between the damage done to the detached leaves and the injury suffered in the field and a negative correlation between larvae mortality on detached leaves and injury in the field. Some varieties, however, though showing no resistance in laboratory tests, have appeared less susceptible in the field, either because they have passed a critical stage when the attack develops or because they can repair the damage by active regeneration. When a variety produces high larvae mortality in laboratory tests, it suffers correspondingly little damage in the field.

The following species of the *Tuberarium* section of *Solanum* have shown resistance to *Leptinotarsa decemlineata*: *S. demissum* Lindl., *S. polyadenium* Greenm., *S. Jamesii* Torr., *S. Millanii* Buk. and Lechn. and *S. Henryi*, Buk. and Lechn. A small degree of resistance has been found in *S. Caldasii* H.B.K., *S. Commersonii* Dun. and *S. chacoense* Bitt. (the form Siambon being outstandingly resistant). *S. verrucosum* Schlechtd. is susceptible but only occasional perfect insects develop on it. The other species which have been tested were susceptible.

Most attention has been paid to *S. demissum*, most strains of which are found to be unsuitable hosts for the Colorado beetle. Larvae of the third and later instars are less susceptible to enforced feeding on *S. demissum* than those of the first and second instars. The hypothesis that the

resistance of *S. demissum* is due to a toxic substance is not considered proved, since the larvae survive longer on *S. demissum* than they do in the absence of food.

The $F_1$ *S. demissum* x *S. tuberosum* is characterized by an intermediate position between the parents and by great variability, in respect of resistance. The most disappointing result from the plant breeding point of view is that so far the resistance of the *S. demissum* parent or even of the $F_1$ has not been recovered either in the $F_2$ or in the first back-cross to *S. tuberosum*, the two latter hybrid generations being about equal in resistance to each other and to *S. tuberosum*. The number of $F_2$ individuals so far investigated is still small and a method is needed which will allow of more rapid elimination of susceptible individuals. It has been shown possible to differentiate the resistance of *S. demissum* seedlings from the susceptibility of *S. tuberosum* seedlings when the young plants are set out fairly closely in a hot bed and artificially infested with larvae of the first instar; a development of this method may be useful in breeding work.

The results of field tests with reference to the relation between injury and the rhythm of development and maturity period are difficult to interpret.

Since regeneration capacity may be a useful character in reducing the effects of injury, experiments have been carried out with cultivated varieties. In an experiment in which the foliage was cut back to ground level at the end of July, it was found that there was no relation between the yield of the control and the relative loss of yield following treatment. It is stated that the relative loss of yield following treatment was the greater, the later the maturity of the variety; a correlation table is given, however, showing the opposite relation. J. L. F.

1445. Gardner, M. E., Schmidt, R. and Stevenson, F. J. 633.491–2.7–1.521.6:575(73)

**The Sequoia potato: a recently-introduced insect-resistant variety.**

Amer. Potato J. 1945 : **22** : 97–103.

The variety Sequoia, released in 1939 (cf. *Plant Breeding Abstracts*, Vol. X, Abst. 170), is a high yielding, late maturing variety with resistance to the attack of flea beetles and leaf-hoppers. In North Carolina the haulm has given resistance to late blight but the tubers are susceptible. In the same state the variety has shown adaptability to a wide range of soil and climatic conditions.

1446. 633.491–2.8–1.521.6

Weiss, F. 632.8:001.4

**Viruses, virus diseases, and similar maladies of potatoes, *Solanum tuberosum* L.**

Plant Dis. Reporter 1945 : Suppl. 155 : 82–140. (Mimeographed).

This bulletin consists of two parts. In the first, descriptions are given of typical potato viruses and virus infections attacking both potatoes and other plants, together with notes on varietal reaction and means of transmission. In the second part, the information on virus and virus-like diseases reported in the literature is summarized. This section includes a statement of the cause of each disease so far as is known, the designation of the common name in each case for the purpose of recording, and a list of the names used in America and other countries and believed to be synonymous.

1447. Parris, G. K. 633.491–2.8–1.521.6(75.5)

**Does the Sequoia variety of potato possess resistance to leaf roll virus and to frost?**

Plant Dis. Reporter 1945 : **29** : 126–27. (Mimeographed).

The variety Sequoia has shown more resistance than Sebago to leaf roll virus and to frost in Virginia. But whether this greater hardiness is due to absence of injury by virus is an unsolved question.

1448. Akimoto, S. 633.492:581.162:578.08

[**Some experiments on hastening flowering in the sweet potato (*Ipomoea Batatas*)**].

Agric. Hort. 1939 : **11** : 993–98.

[From Jap. J. Bot. 1940 : **10** : No. 4 : p. (33) : Abst. 124].

As the sweet potato flowers rarely in Japan, three methods of accelerating flowering were tried, viz. grafting on a botanically related tuberless plant, water culture and short-day treatment. The last-mentioned gave the best results, though strains vary in their response. Sweet potato scions on *Pharbitis Nil* were especially successful.

Selfing of the flowers obtained as described above gave a set of 5% in the best cases but only 0·8% in another. On the other hand the set was increased to 16·3–58·1% by cross-fertilization.

1449. 633.51:575(47)

**(New varieties of cotton).**

Socialističeskoe Zemledelie (Socialist Agriculture) 1944 : No. 122 : p. 2.

Tests under commercial conditions on the collective farms of the Murgal Oasis in Central Asia have been carried out on new varieties of long-fibred cotton bred at the Turkmen Cotton-Lucerne Experimental Station. The new varieties are of high quality and yield 200% more fibre than the cotton cultivated at present on the collective farms of the Mari Province.

1450. Miège, E. 633.51:575(61)

Les recherches cotonnières en Afrique du Nord. **(Cotton researches in North Africa).**

Un. Coton. Emp. Français 1942 : 15–43.

An historical account is given of cotton breeding in Algeria, Tunisia and Morocco. Hybridization studies are mentioned and several of the more important varieties are described; attention is drawn to the fine quality of derivatives of the variety Pima. Genetical studies have been made of valve number and villosity. A bibliography of 94 titles is appended.

1451. Beasley, J. O. 633.51:575.127.2

**Wild species may aid in breeding better cottons.**

Cott. & Cott. Oil Pr. 1942 : **43** : No. 16 : 5–6.

A popular account is given of the problems encountered in crossing various wild species and the cultivated American cottons, before and since the use of colchicine. An indication is given of the possible development from such hybrids of cottons with almost round fibres, finer fibres than those of the Upland cottons, and with resistance to certain insects and diseases.

1452. Konstantinov, N. M. 633.51:581.165.71(47)

**On the influence of the stock upon the scion in cotton.**

C.R. (Doklady) Acad. Sci. U.R.S.S. 1945 : **46** : 159–61.

Late maturing varieties have been grafted at the cotyledon stage on to the following stocks: (1) an arborescent type incapable of natural blooming under the conditions of long day at Tashkent, (2) an extremely early annual cotton, and (3) $F_1$ hybrids from the cross *G. hirsutum* x *G. barbadense*. With the exception of the first all the stocks had reached the reproductive period at the time of grafting. Rate of development of the scion, reproduction capacity and general appearance were markedly influenced by those of the stock.

1453. Moore, J. H. 633.51:581.6:575(75.6)

**Cotton fiber: strains grown influence quality.**

Res. & Fmg, Raleigh, N.C. 1945 : **3** : Progr. Rep. No. 3 : 3–4.

The factors making up the quality of cotton fibre are discussed, and it is suggested that the usual commercial evaluation based upon staple length, ginning out-turn and yield does not provide a complete estimate of quality, but that fineness, strength and other properties of the fibre should also be considered.

Work was begun in 1934 at the North Carolina Experiment Station with the object of investigating the influence of variety upon fibre quality. Strains have been inbred for nine generations; no injurious effects have been observed as a result of this inbreeding. Differences within varieties for staple length and fibre diameter are reported.

1454. Stoa, T. E. 633.52:575(78.4)

**Sheyenne—a new variety of flax.**

Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1945 : **7** : No. 4 : p. 17.

The new variety Sheyenne is a selection from a cross between Ottawa 770B and Buda. It ripens early, and has a satisfactory oil yield and an iodine number higher than that of Bison. Sheyenne is immune to all races of rust known in Dakota, highly resistant to wilt, and as tolerant to pasmo as Bison, Buda and Koto. It is believed that the variety will be particularly valuable in the south-eastern areas of the State where earliness is desirable.

1455. Miller, J. H., Burton, M. G. and Manning, T. 633.52:581.4:575.42(73)
**A statistical study of the relations between flax fiber numbers and diameters and sizes of stems.**
J. Agric. Res. 1945 : **70** : 269–81.
Anatomical investigations indicate that, for flax stems of equal diameter, the range in the number of fibres and fibre bundles is probably sufficiently wide to provide a basis for single plant selections.

1456. Granhall, I. 633.52–2.452:576.16:631.521.6(48.5)
Linrosten—en spånadslinets fiende. (**Flax rust—an enemy of spinning flax**).
Lantmannen 1944 : **28** : 733, 735–36.
In this note on *Melampsora Lini* it is stated that earlier observations in Sweden have suggested that certain varietal differences existed in susceptibility to the fungus, Concurrent being more severely attacked than Herkules. No clear varietal difference has however been noticeable this season [1944]. A report from Denmark records that Concurrent seems to be less seriously attacked than the blue-flowered flaxes commonly grown there.
German investigations, showing that there are several races of the fungus which differ in their distribution and virulence, may explain such variations in the resistance of varieties.
The breeder should aim at the production of new varieties resistant to all the races of the fungus that occur within a wide area.

1457. Protzman, C. M. 633.523–1.531.12:575.42(81)
**The new jute-production industry of Brazil.**
Foreign Agriculture 1945 : **9** : 55–64.
In the development of jute production in the Amazon Valley, importance is attached to the method of seed selection.

1458. Crane, J. C. and Acuña, J. B. 633.524.35:582(72.91)
**Varieties of kenaf (*Hibiscus cannabinus*), a bast fiber plant, in Cuba.**
Bot. Gaz. 1945 : **106** : 349–55.
A taxonomic description is given of the varieties of *H. cannabinus* being grown at present in Cuba. Two varieties, *H. c. viridis* and *H. c. vulgaris* are recognized, each comprising a range of strains which may afford scope for selection.

## SUGAR PLANTS 633.6

1459. Dillewijn, C. van 633.61:575
Fortschritte der Zuckerrohrzüchtung. (**Progress in sugar cane breeding**).
Z. Pflanzenz. 1942 : **24** : 569–91.
A comprehensive review is given of progress in sugar cane breeding up to the year 1940. After a preliminary account of the systematics of the sugar canes, details are given of work on inter-varietal, interspecific and intergeneric hybridization, on genetics and cytology, and on the technique of hybridization. Separate sections then follow on the work of the following regions: Java, India, Louisiana, Florida, Barbados, British Guiana, Hawaii, Mauritius, Queensland and New South Wales. A bibliography of 61 titles is appended.

1460. Coelho, M. and Coelho, C. 633.61.00.14(81)
Comportamento cultural-econômico de canas "P.O.J." e "Co" na zona da mata de Pernambuco. (**Agricultural and economic behaviour of P.O.J. and Co. canes in the Pernambuco forest zone**).
Bol. Sec. Agric. Pernambuco 1940 : **6** : 89–103.
Comparisons were made between Caiará, one of the best local canes, and P.O.J. 2878, 2714 and 2727, and Co 290 and 281. Observations were made on tillering capacity, height and thickness of canes, yield, cost of harvesting and sugar content; the variety Co 290 gave the best all-round performance.

1461. Lynes, F. F. 633.63:581.04:576.356.5
**Polyploidy in sugar beets induced by storage of treated seed.**
J. Amer. Soc. Agron. 1945 : **37** : 402–04.
The amount of induced polyploidy in sheared seed was found to be greater after treatment with "Improved Ceresan" alone than when used in combination with fume phosphate. In most cases a larger number of polyploids were induced in sheared than in whole seed. The type of bag used for storage was also found to affect the number of induced polyploids.

1462. Vasconcélos, D. de M. 633.682.00.14(81)
Competição de variedades de mandioca. (**Competition of cassava varieties**).
Bol. Sec. Agric. Pernambuco 1940 : **6** : 164–73.
Variety tests carried out with 7 cassava varieties and subjected to statistical analysis, showed the variety Veneninho to be the best in yield and Vira Barco the most tolerant of adverse conditions.

## STIMULANTS 633.7

1463. Bolsunow, I. 633.71:575.14
Zur Untersuchung der Heterosis bei *Nicotiana rustica* L. V. Fortgesetzte Selbstbefruchtung und Ernteertrag. (**The investigation of heterosis in *N. rustica* L. V. Continued self-fertilization and yield**).
Z. Pflanzenz. 1944 : **26** : 223–44.
Evidence is brought forward against the theory of Lysenko that continued selfing leads necessarily to varietal degeneration and that such a condition can be alleviated by intravarietal crossing. Yield data are given for inbred lines of *N. rustica* in which no significant evidence of deterioration in yield is apparent. Intravarietal crossing between inbred lines led to no increase in yield although intervarietal crossing of inbreds exhibited the normal heterotic effects.
Darwin's attitude to this matter is considered in an extended footnote and the evidence from other authors on non-degeneration in self-fertilized varieties is presented.
There is a useful bibliography of the relevant Russian literature.

1464. Woodmansee, C. W.,
Rapp, K. E. and
McHargue, J. S. 633.71:581.6:575(76.9)
**Nicotine content of *Nicotiana rustica* grown in Kentucky and of 15 selections of dark tobacco.**
Bull. Ky Agric. Exp. Sta. 1944 : No. 470 : Pp. 11.
The varieties Brasilea and Olson (*N. rustica*) produced tobacco fairly high in nicotine content when grown under greenhouse conditions. When cultivated in the field, however, the same varieties showed a reduced nicotine content which was much inferior to that of 15 selections of dark tobacco grown in Princeton. The breeding of a strain of dark tobacco adapted to conditions in Kentucky therefore appears to be more promising than the development of a high yielding strain from a variety of *N. rustica*.

1465. Akkoyunlu, Z. and
Ipekoglu, F. 633.71–1.531.12(56)
Tütün çeşidlerimizin standardlanmasina dogru. (**Towards the standardization of our tobacco varieties**).
Tütün Institüsü Raporlari 1944 : **3** : 99–112.
The programme of standardization of native varieties begun in 1942 is described. The four chief tobacco growing regions of Turkey have been subdivided into 20 planting districts. Only certain improved pure varieties are to be cultivated in each of these districts, one variety usually being allotted to each district. Pure seed is to be generally distributed at least once every three years.

1466. 633.71–2–1.521.6(47)
(**Disease resistant varieties of tobacco**).
Socialističeskoe Zemledelie (Socialist Agriculture) 1944 : No. 153 : p. 2.
A description is given of a variety of tobacco resistant to mosaic and mildew, bred by Ternovskiĭ in Kazahstan. It gave good results in tests under commercial conditions at the Alma-Ata State tobacco farm and another location.

1467. 633.71–2.48–1.521.6(72.95)
GOENAGA, A. 633.71–2.8–1.521.6:575(72.95)
**Notes on diseases of tobacco observed in Puerto Rico during the 1944-45 season.**
Plant Dis. Reporter 1945 : **29** : 311–14. (Mimeographed).

Highly mosaic resistant strains have been selected, some of which approach the commercial varieties in quality and are superior in yield; numerous back-crosses to commercial varieties have been made to improve type and quality. A fertile hybrid from the cross *N. Tabacum* x *N. glutinosa* has been obtained. When this hybrid is used as the female parent in back-crosses to commercial varieties, and mosaic resistant strains derived from hybrids involving Ambalema, satisfactory seed germination is obtained. Under field conditions $F_1$ back-cross progeny have given indications of mosaic resistance.
With the possibly fortuitous exception of some of the mosaic resistant strains, a general susceptibility to the leaf roll virus, first appearing in the 1943–44 crop at the Rio Piedras Station, has been exhibited among over a hundred varieties, strains and hybrid selections under field conditions. The variety Ambalema showed susceptibility.
Some degree of resistance to the leaf spot diseases, *Cercospora Nicotianiae, Colletotrichum Nicotianae* and *Phyllosticta Nicotianae,* was found in Virginia No. 12.

1468. 633.73:575(81)
O levantamento botânico das variedades cafeeiras. (**The botanical improvement of coffee varieties**).
Bol. Superint. Serv. Café, São Paulo 1945 : No. 217 : 322–23.

A brief account is given of recent breeding and genetic work with coffee carried out in Brazil.

## CONDIMENTS 633.84

1469. TOOLE, M. G. and
BAMFORD, R. 633.842:576.356.5:581.04(73)
**The formation of diploid plants from haploid peppers.**
J. Hered. 1945 : **36** : 67–70.

Diploid plants were obtained by treating haploid plants with colchicine, 25% of the treatments being successful in doubling the chromosome number. Meiosis in these diploids was found to be normal, and all the plants produced fruits from which seeds were obtained. Seedlings grown from the haploid doubled forms also showed regular meiosis and pollen formation.

## OIL PLANTS 633.85

1470. FICKENDEY, E. 633.855.34:575
Die Züchtung der Ölpalme. (*Elaeis guineensis* Jacquin). [**Oil palm breeding (*E. guineensis* Jacquin)**].
Z. Pflanzenz. 1944 : **26** : 136–62.

This review of breeding work with the oil palm deals with the following aspects: the economic value of oil palm products, the systematics of the genus *Elaeis*, the distinguishing characters of the principal fruit types, floral biology and morphology, hybridization, genetics, breeding objectives, methods of breeding, and the results of work already done in Sumatra and the Belgian Congo.

## MEDICINAL PLANTS 633.88

1471. STEERE, W. C. 633.885.1:581.6(8)
**The botanical work of the cinchona missions in South America.**
Science 1945 : **101** : 177–78.

This short report summarizes recent investigations into cinchona material in South America, and mentions that chemical analyses have brought to light important physiological distinctions between varieties and species. A race of *Remijia pedunculata* yields bark containing up to 3% of quinine sulphate.

## RUBBER PLANTS 633.91

1472. Blanchard, A. J., Revised by Avakian, A. and Moats, R. W. 633.913:016
**Guayule. A list of references.**
Libr. List U.S. Dep. Agric. Libr. Washington, D.C. 1944 : No. 10 : Pp. 61. (Mimeographed).
A useful bibliography is presented of papers on the cultivation and botany of guayule, its breeding and genetics, and various aspects of its technology.

1473. Haasis, F. W. 633.913:578.65
**Some staining technics for guayule study.**
Stain Technol. 1945 : **20** : 37–44.
A description is given of satisfactory methods of staining tissues and secretions.

1474. Filippov, D. 633.913:581.165(47)
**(Root cuttings for sowing kok-saghyz).**
Socialističeskoe Zemledelie (Socialist Agriculture) 1944 : No. 114 : p. 2.
An investigation has been made of the propagation of kok-saghyz by root cuttings. No shoots appeared in the year during which the cuttings were planted. In the following summer the cuttings planted in the latter part of the previous summer showed abundant growth. The roots were twice the size of those of two-year-old plants grown from seed and contained a higher rubber content.

1475. Powers, L. and Gardner, E. J. 633.913:581.331.2:575.22:575(73)
**Frequency of aborted pollen grains and microcytes in guayule, *Parthenium argentatum* Gray.**
J. Amer. Soc. Agron. 1945 : **37** : 184–93.
Usually less than 50% of the commercial seed of guayule is viable. The percentage of aborted pollen grains and of microcytes (grains less than 13·6 microns in diameter) have been estimated in a number of commercial varieties and in collections from seed of natural populations. In Mexico and Texas considerable genetic variability in percentage of aborted pollen grains and microcytes is exhibited. Both heterogeneity and heterozygosity were found to be important in determining variability. The data obtained are classified on the basis of the mode of reproduction, location of the seed collection, chromosome number, plant type and other factors; their significance in a breeding programme is briefly discussed.

1476. Manskaja, S. M. and Popov, G. I. 633.913:581.6:575(47)
**(Increasing the rubber content of kok-saghyz).**
Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1944 : No. 4 : 187–92.
When the roots of ordinary kok-saghyz plants increase in size, the content of rubber does not increase proportionately, but lags behind; consequently, the plant breeder cannot place unreserved trust in the size of roots as a guide in his choice. A new type of plant has been discovered, however, in the root of which additional vascular bundles occur, each surrounded with latex vessels. The roots are not only larger than the normal, but contain more latex. The origin of the additional vessels is discussed. They are especially numerous near the crown of the root, and seem to be connected, therefore, with the leaf and stem system of the plant.
The character described was found to be transmissible through successive generations, both vegetatively and by seed. I. Z.

1477. Warmke, H. E. 633.913:581.6:576.356.5
**Experimental polyploidy and rubber content in *Taraxacum kok-saghyz*.**
Bot. Gaz. 1945 : **106** : 316–24.
Field-grown tetraploids of *T. kok-saghyz*, obtained by the colchicine technique, have proved superior to the diploids in root size and percentage rubber content.

## FRUITS AND NUTS 634

1478. Wellington, B. 634(74.7)
**Trends in varieties and culture of cherries, pears and peaches.**
Proc. 90th Annu. Mtg N.Y. St. Hort. Soc. 1945 : 249–57.
Descriptions are given of more recent varieties of pear, cherry and peach.

1479. *Ozbek, S. 634.1:581.162.4(56)
Çiçek tomurcuğu teşekkülü esas tutularak Kastamonu dolaylarindaki en önemli meyve türlerinin verimliliğine tesir eden biyolojik faktörler üzerinde araştirmalar. (**Flower bud formation and investigations on the biological factors influencing productiveness in the chief fruit varieties in Kastamonu**).
T.C. Ziraat Vekâleti Ankara Yüksek Ziraat Enstitüsü 1943 : No. 143 : Pp. 88.
The most important practical results of a survey on fertility in the apple and pear varieties of the Kastamonu region are recorded. Flower bud formation and fruit formation were separately investigated.

1480. Wellington, R. 634.11(74.7)
**Notes on new varieties of apples.**
Proc. 90th Annu. Mtg N.Y. St. Hort. Soc. 1945 : 232–36.
A description is given of the more recent varieties of early, autumn and late apples.

1481. Sugawara, T. 634.11:577.16(52)
[**The vitamin C content of apples**].
J. Hort. Ass. Jap. 1941 : **12** : 109–12.
Varietal differences in the ascorbic acid content of various apple varieties grown in Japan are described.

1482. Zwintzscher, M. 634.11–2.111–1.521.6:575.11(43)
Experimentelle Untersuchungen zur Züchtung von Obstgehölzen mit frostwiderstandsfähigen Fruchtknospen und Blüten. I. Malusformen. (**Experimental researches for breeding fruit trees with frost resistant fruit buds and flowers. I. *Malus* forms**).
Z. Pflanzenz. 1944 : **26** : 245–352.
Extensive details are given of the frost resisting qualities of apple varieties grown in Germany. The varieties to be tested were treated with varying periods of controlled low temperature in a cold chamber at different stages in the yearly developmental cycle. Observations were made of the degree of frost injury caused and of the manner in which it affected the vegetative shoots and fruit buds. In addition to studies made of cultivated forms, the wild species *M. baccata, M. cerasifera, M. prunifolia, M. spectabilis* and *M. Zumi* were also investigated.
The mode in which frost affects the subsequent development of the shoots was examined in detail, also its effect on pollen germinability.
Outdoor investigations were carried out on the effect of frost on a large number of varieties, special attention being paid to the importance of locality, and to the nature of the frost injuries caused and their effect on the subsequent development of the fruit buds.
From these experiments, the importance of intervarietal differences in the type of frost resistance exhibited was established. The introduced American varieties were most resistant, and next the older varieties from northern and eastern Europe; the German and west European forms were most susceptible.
Genetical studies were made of the $F_1$ seedlings of *M. Zumi* x Winter Gold Pearmain, the progeny of open-pollinated trees of Taffeta, Cox's Orange Reinette and Geheimrat Dr Oldenburg, and the hybrid seedlings produced from inter-pollinating the two varieties last named. The complexity of the genetical basis of frost resistance was realized after examining these progenies. Resistance appears to be determined polymerically and in the case of crosses between wild and cultivated forms, the resistance and other characters of the wild species tend to be dominant. Since the small fruits of the wild *Malus* species appear in their hybrid offspring, some disadvantage attends their use in breeding for frost resistance.

1483. Southwick, L.,
French, A. P. and
Roberts, O. C. 634.13:578.088(74.4)
**The identification of pear varieties from non-bearing trees.**
Bull. Mass. Agric. Exp. Sta. 1944 : No. 421 : Pp. 51.
The various plant characters are described which can be used as a basis for identifying varieties in the nursery. Annotated illustrations are given of the one-year shoot growths of 41 varieties. In the final section more complete descriptions are presented of these and six additional varieties.

---

* An abridged translation of this bulletin is on file at the Bureau.

1484. MATSUBARA, S., IKEDA, M. and TEZIMA, K. 634.21:581.162.5(52)
**(On the sterility of mume).**
J. Hort. Ass. Jap. 1941 : **12** : 113–22.
The occurrence of perfect and imperfect flowers has been studied in the variety Koshu Saisho. Fertility in intervarietal crossing depends considerably upon the male and female parents but is in general higher than in self-pollination. Only Koshu Saisho was sufficiently self-fertile to be of economic value.

1485. MCWHORTER, O. T. 634.22:575.42(79.5)
**The eastern Oregon wild plum.**
35th Rep. 58th Ann. Mtg Ore. St. Hort. Soc., and 29th Ann. Mtg West. Nut Growers Ass. 1943 : 45–46.
The Oregon wild plum, *P. subcordata*, is described. Valuable selections have roundish, bright red fruit suitable for several purposes, and are more winter hardy than the hardy commercial varieties available. It is considered that the wild plum is useful for cultivation in the high altitudes of eastern Oregon.

1486. CALDWELL, J. S. and CULPEPPER, C. W. 634.25:581.6(73)
**Further studies in utilization of eastern freestone peaches. I. Studies of canning quality.**
Fruit Prod. J. 1944 : **23** : 170–73, 186–87, 191.
The comparative suitability for canning of 58 varieties of freestone peaches has been studied; 18 of the varieties were included in tests for the first time. The varieties were graded into five groups on the basis of colour, general appearance, texture and flavour.

1487. CULPEPPER, C. W. and CALDWELL, J. S. 634.25:581.6(73)
**Further studies in utilization of eastern freestone peaches. II. Studies of quality for preserve making.**
Fruit Prod. J. 1944 : **23** : 200–05.
A considerable number of peach varieties, mostly yellow, melting-fleshed, dessert types, were harvested at the optimum stage of ripeness and made into preserves by a uniform method. After a storage period of six months the fruits were graded for colour, texture, flavour, degree of disintegration and consistency, and the varieties were grouped into three general fruit quality classes. An investigation was also made of the quality of the canned and dehydrated products made from the same varieties and trees. In general, little relationship was found between the quality of the preserve made from a variety and that of its dehydrated or canned product. A small group of varieties, however, gave products of high quality in all three methods of processing.

1488. VELDHUIS, M. K. and NEUBERT, A. M. 634.25:581.6(79.7)
**Freestone peach varieties for canning in Washington.**
Fruit Prod. J. 1944 : **23** : 229–33.
A determination has been made of the suitability for canning of several varieties of freestone peaches. Elberta, Gold Medal, Ibes No. 1 and Early Elberta were found to be the most suitable varieties when all points of quality were considered, although occasionally exhibiting a tendency to cling. A number of varieties earlier or later than Elberta may prove useful in lengthening the canning season. Several varieties were considered unsuitable on the basis of texture, discoloration or semi-clinging.

1489. MEADER, E. M., DAVIDSON, O. W. and BLAKE, M. A. 634.25–2.111–1.521.6:578.088(73)
**A method for determining the relative cold hardiness of dormant peach fruit buds.**
J. Agric. Res. 1945 : **70** : 283–302.
A method of artificially freezing dormant fruit buds is described, which should provide a reliable, time-saving means of testing the relative cold resistance of fruit buds of different varieties.

1490. CHEN, T.-Y. 634.3:576.354.4(51)
**(Cytological observations on twenty-two citrus fruits).**
J. Agric. Ass. China 1944 : No. 177 : 1–8. p. (I).
An examination has been made of pollen mother cells in citrus fruits cultivated in Chengtu. A chromosome number of $n = 9$ was found in all cases. Secondary association was often observed at metaphase II, the maximum number of chromosomes associated being 4. It is suggested that the citrus fruits are secondary polyploids comparable to *Pyrus* and *Malus*.

1491. HU CHANG-CHIH and
WU CHIEN-CHI. 634.31:575.42(51)
**Selection studies of Hwang-kuo (sweet orange) at Kin-tang and Kiang-Tsing in Szechuan, Paper II.**
Nanking J. 1942 : **11** : 51–72.
[From Hort. Abst. 1944 : **14** : p. 173 : Abst. 1317].
A two-year selection of the sweet orange of Szechuan has shown the great differences existing between different strains. Descriptions are given of the fruit of some 20 clones considered promising. Progenies of these have been vegetatively produced since the spring of 1939 and are now being studied.

1492. BATCHELOR, L. D. and
ROUNDS, M. B. 634.334–2.19–1.521.6:581.165.71
**Effect of root-stocks on lemon decline and yield in two experimental orchards.**
Calif. Citrogr. 1944 : **29** : 242–43, 265–69.
Investigations have shown that the "decline" observed in lemon plantations in California is affected both by the type of rootstock used and also by intervarietal and intravarietal differences between the scions. Selection may help in reducing the onset of this condition, which seriously affects the yield of the varieties Eureka and Lisbon.

1493. MIYABAYASHI, T. 634.451:581.47:581.192
**(Varietal differences in the tannin cells of kaki fruits).**
J. Hort. Ass. Jap. 1941 : **12** : 143–54.
Varietal differences in the size and distribution of tannin cells in kaki fruits are described.

1494. CRANMER, C. B. 634.53:575(51+52)
**Asiatic chestnut.**
Flor. Exch. 1943 : **101** : No. 20 : p. 9.
[From Biol. Abst. 1944 : **18** : Sect. D : p. 792 : Abst. 7151].
Observation has been made of Chinese and Japanese chestnut seedlings from seed collected in 1928 in Japan and Korea. In 1943, variation in survival (13, 25, 50%), height, yield and quality of nuts, and in tolerance to blight, were found between and within three strains of seedlings. $F_2$ seedlings from nuts of the most productive strain, planted under more favourable conditions, showed a survival of 84–92%.

1495. COOPER, J. F. 634.58:575(75.9)
**Once in a blue moon—a new goober that clicks.**
Sth. Seedsman 1945 : **8** : No. 4 : 11, 51.
Dixie Runner is a new variety of peanut developed from a cross between Florida Small White Spanish and Dixie Giant. The variety is equal or superior to Florida Runner in freedom from damaged or shrunken seed, and in yield of mature seed and oil.

1496. CARABIA, J. P. 634.6:582
Notas sobre la nomenclatura de algunas palmas cubanas. **(Notes on the nomenclature of certain Cuban palms).**
Caribbean Forester, P.R. 1945 : **6** : 159–164. (Mimeographed).

LEÓN, H.
Comentarios sobre el articulo de J. P. Carabia: "Notas sobre la nomenclatura de algunas palmas cubanas". **(Comments on J. P. Carabia's article on "Notes on the nomenclature of certain Cuban palms").**
Ibid. 1945 : **6** : 165–70. (Mimeographed).
It is suggested by Carabia, mainly on grounds of convenience, that the binomial *Copernicia macroglossa* Wendl. be retained although a *nomen confusum*, that the genus *Acoelorraphe* Wendl.

be retained in spite of a somewhat unsatisfactory diagnosis, and that the binomial *Acrocomia crispa* (H.B.K.) C. F. Baker be retained for the common "corojo" although the application of the term is doubtful. León, in his reply, points out that the first suggestion is contrary to the International Rules of Botanical Nomenclature, that the second suggestion is a matter of opinion, and that the name *Acrocomia crispa* is probably a *nomen dubium* and should be relegated to the synonymy.

1497. Rosanova, M. A. 634.71:582
**(On some species, subspecies and varieties within the conspecies *Rubus Idaeus* L.)**
J. Bot. U.R.S.S. 1945 : **30** : 44–48.

The importance is urged of applying ecological and geographical principles in establishing lower systematic units, as opposed to the establishment of innumerable artificial varieties and subspecies on purely morphological grounds. By applying these principles within the collective Linnaean species *R. Idaeus* L. the author arrives at the conclusion that *R. Komarovi* Nakai. is a subspecies of *R. sachalinensis*; that variety *simplicior* Brenner is a hybrid form, having been observed as a segregate in $F_3$ crosses of *R. vulgatus* x *R. caesius*, and cannot therefore be ascribed any systematic rank; and that the Caucasian highland form of *R. vulgatus* differs in many characters, including frost resistance and large fruits, and should be established as a distinct subspecies *R. vulgatus* subsp. *Buschii* Roz.

1498. Williams, C. F. 634.711:575.127.2(75.6)
**Breeding raspberries for North Carolina.**
Res. and Fmg, Raleigh, N.C. 1945 : **3** : Progr. Rep. No. 2 : 9, 12.

A description is given of some of the foreign species of raspberry which have been crossed with American varieties in breeding work at the North Carolina Experimental Station. These species are *R. Kuntzeanus, R. biflorus, R. coreanus, R. parvifolius* and *R. glaucus*. Promising hybrids have been obtained by various breeding methods. Among these hybrids is Dixie, released in 1938.

1499. Bailey, L. H. 634.715:582(73)
**Species Batorum Boreali-Americana. IX. Arguti, Rubi Europae peregrini.**
Gentes Herbarum, Ithaca, N.Y. 1945 : **5** : 591–856.

In this fascicle, the author completes his account of the North American blackberries by describing the section *Arguti*. Descriptions are also given of a few adventive European species.

1500. Darrow, G. M. and
Camp, W. H. 634.73:575.127.2:575(73)
***Vaccinium* hybrids and the development of new horticultural material.**
Bull. Torrey Bot. Cl. 1945 : **72** : 1–19.

The blueberries are characterized as a group by an abundance of polyploids and an absence of well-defined sterility between species of the same chromosome number. A considerable number of crosses between species of the same and different chromosome number have been made; most of the hybrids are completely fertile. The various factors are discussed which are believed to be responsible for the numerous populations of interspecific hybrids found today in the wild state. The wild forms suspected to be natural hybrids are described; in many cases the hybrid combination has been obtained by experimental crossing. The economic possibilities of the genus *Vaccinium* and the characteristics that have to be considered in breeding improved varieties are fully discussed.

1501. Camp, W. H. 634.73:582:576.16
**The North American blueberries with notes on other groups of Vacciniaceae.**
Brittonia N.Y. 1945 : **5** : 203–75.

A valuable account is given of the complex taxonomy of the North American members of *Vaccinium* subgenus *Cyanococcus*. After detailed descriptions of the morphology, geographical distribution, cytology and range of variability of each species, the author gives a succinct account of the synonomy of the forms treated. In the light of these facts, a final discussion on the phylogeny of the subgenus is given, special emphasis being laid on the importance of allopolyploidy in the establishment of new species.

1502. Coe, F. M. 634.75(79.2)
**Strawberry varieties old and new.**
Fm Home Sci., Utah 1945 : **6** : No. 1 : 7, 10.
Descriptions are given of varieties suitable for planting in western Utah to supplement or replace the standard variety Marshall.

1503. Culpepper, C. W. and Caldwell, J. S. 634.75:581.6(73)
**Varietal adaptability of strawberries to preservation in sulphur dioxide-calcium solution.**
Fruit Prod. J. 1943 : **23** : 5–9, 25, 27, 29, 46–51.
Fruit of twelve varieties widely grown in the United States were made into jam when fresh and after preservation in sulphur-dioxide-calcium solution. For each type of jam the varieties were graded into four groups on the basis of colour of jam, consistency, maintenance of berry form and flavour. With three exceptions the varieties held the same individual rank in jams made from fresh and preserved fruit. Fairfax, Maytime and Redstar were the best varieties.

1504. Steuk, W. K. 634.835:575.22:575(77.1)
**Variations of the Catawba grape.**
Bi-m. Bull. Ohio Agric. Exp. Sta. 1945 : **30** : No. 232 : 31–33.
Variations observed in the Catawba variety are described. These include: (1) vines lacking inflorescences, (2) vines with straggly clusters, (3) parthenocarpic vines, and (4) a more productive and earlier ripening line than the original variety. The last named offers possibility of improvement.

1505. Covas, G. and Christensen, J. R. 634.835–1.421:519.24
Determinación del tamaño de parcelas para ensayos comparativos de rendimientos en la vid. (**Determination of the size of plots for comparative yield tests in vine**).
Rev. Argent. Agron. 1945 : **12** : 26–29.
An examination of the standard error in experiments using plots of different sizes led to the conclusion that the smaller plots were the more efficient. Plots of one row of four plants are those recommended.

## FORESTRY 634.9

1506. Jablokov, A. S. 634.972.3:575–181:576.356.5
**(A giant form of *Populus tremula* in woodlands of the U.S.S.R.).**
Trudy Vsesojuz. Naučno-Issled. Inst. Lesnogo Hozjaĭstva (Trans. All-Union For. Res. Inst.) 1941 : No. 23 : Pp. 52.
The author, who discovered a giant form of *P. tremula* in the U.S.S.R., is inclined, unlike the Swedes, by whom it was first discovered in Sweden, to attribute its origin to vegetative propagation; though he does not exclude polyploidy as an alternative cause. The peculiarities of leaf stomata, tissue cells, and other characters, which distinguish the giant and other forms from the normal were found to be hereditary and not attributable directly to soil conditions or other factors of the environment. I. Z.

1507. *Aljbenskiĭ. 634.972.3:575.127.2(47)
**(Poplar hybridization in the U.S.S.R.)**
J. Bot. U.R.S.S. 1944 : **29** : No. 2–3 : 86–90.
A brief outline is given of previous work on poplar tree breeding in the U.S.S.R. Various methods of hybridization are described.
The best results of all have been obtained from crosses of *P. alba* with the Turkestan green poplar (*P. Bolleana* Lauche and *P. Bachofenii* Wierz.); the two-year-old hybrids were 225 cm. high, frost-resistant, and exceedingly ornamental. All investigations have indicated that the characteristic features of the Turkestan poplar, pyramidal growth and dark green dense foliage, sometimes crimped, are dominant.

* An abridged translation of this paper is on file at the Bureau.

Crosses of *P. alba* with *P. tremula* have given good results; two-year-old seedlings, 160 cm. high, show resemblance sometimes to the maternal parent and sometimes to the pollen parent. Jablokov found differences in morphology and resistance to *Fusarium* in the progenies from different catkins on the same branch.
Crosses of *P. tremula* with the Turkestan poplar have given varying results: either the hybrids were smaller and poorer than the *P. tremula* parent (cf. Bogdanov and Berezin) or they were much better (cf. Jablokov and Aljbenskiĭ). Crosses of *P. tremula* with *P. balsamifera*, *P. canadensis*, *P. suaveolens*, the Petrov hybrid, and to a certain extent with *P. nigra*, have usually given seed and young seedlings but the latter are feeble and economically valueless. Jablokov obtained a strong growing hybrid of *P. tremula* x *P. pyramidalis*, and Aljbenskiĭ produced vigorous seedlings from crosses of *P. tremula* with *P. nigra*, *P. canadensis* and *P. pyramidalis*. Hybrids of *P. balsamifera* x *P. tremula* are strong growers and their cuttings root well; their progeny fall into three groups, two of which are characterized by weak growth; the third group resembles the maternal parent and grows well.
*P. balsamifera* crosses well with *P. berolinensis* and with *P. canadensis*, *P. laurifolia* Ledeb., *P. nigra*, *P. pyramidalis*, *P. suaveolens*, *P. tristis* Fisch., *P. Simonii* Carr. and the Pushkin hybrid. All crosses generally produced some strong growing hybrids worthy of multiplication, and some have been prepared by breeders for release to planters.
Crosses of *P. canadensis* with several species have been studied. Bogdanov obtained a hybrid of *P. canadensis* x *P. nigra* which combined a shorter vegetative period with strong growth, and appears to be promising for the production of frost-resistant poplars.
*P. nigra* has been crossed with a number of species, but *P. nigra* itself does not root well, and the problem of getting superior hybrids which root well from winter cuttings is still unsolved. Berezin found that the hybrid *P. nigra* x *P. laurifolia* resembles one parent one year and the other in other years, using the same parent plants each year; importance must therefore be attached to a study of the conditions of hybridization.
A table summarizing the results of interspecific crosses in the U.S.S.R. indicates that insufficient attention has been given to the use of distant geographical forms and of certain large hybrids such as *P. Eugenii*, *P. robusta* and *P. serotina*, nor have the poplars from the Far Eastern and Central Asian provinces been used as seed parents.

1508. Fassett, N. C. 634.975:575.127.2:582(73)
***Juniperus virginiana*, *J. horizontalis*, and *J. scopulorum*. III. Possible hybridization of *J. horizontalis* and *J. scopulorum*.**
Bull. Torrey Bot. Cl. 1945 : **72** : 42–46.
In one district in Wyoming, there is evidence that the cross *J. scopulorum* ♀ x *J. horizontalis* ♂ occurs, but no evidence of reciprocal crossing. On the western slopes of the Big Horn Mountains, Wyoming, and on the adjacent plains where *J. horizontalis* is not found, a depressed shrub was observed with the foliage and fruit of *J. scopulorum* and described as *J. scopulorum* var. *patens*, var. nov. It is suggested that this variety may have originated as the result of an ancient hybridization between *J. scopulorum* and *J. horizontalis*.

1509. Wettstein, W. von 634.975:581.48:575.42
Saatgut und Züchtung. (**Seed and breeding**).
Forstwiss. Zbl. 1942 : **64** : 135–43.
Details are given of the variation in thousand seed weight, germination percentage, cotyledon number and seed size of the progenies of a series of pine mother-trees. The inter-relations between these characters are considered, also their relative importance as selection criteria. It is recommended that trees be chosen for breeding if their progenies exhibit drought resistance, vigorous root development, a high regeneration capacity of the apical shoots, a high thousand seed weight, a good seed set, a high germination percentage, good seedling growth, or a relatively large number of cotyledons.

1510. Righter, F. I. 634.975:581.48:581.143.7:519.241.1(73)
***Pinus*: the relationship of seed size and seedling size to inherent vigor.**
J. For. 1945 : **43** : 131–37.
It has been found that seed weight in *Pinus* is positively correlated with seed size but not with inherent vigour. The correlation has therefore no genetic basis. A discussion is given of the practical importance of this conclusion.

1511. 634.975–1.531.12(48.5)
Skogsodling och fröproveniens. (**Forest planting and seed provenance**).
Skogen 1945 : **32** : 93–94.
The difficulties of providing adequate and suitable seed from various parts of Sweden for regions of Norrland, where the set is very low or a complete failure, are mentioned. The need is pointed out for the adoption of some basic principles and standards to regulate the use of seed brought from the area of collection to another tract for planting. Spruce and pine require different regulations in delimiting areas of seed transference.
The practical suggestions in O. Langlet's recent contribution on the subject (published elsewhere) form the basis of the present paper.
Spruce and pine genera are separately dealt with and the role of altitude, as well as latitude and longitude, is considered in determining the range of seed transfer. The views expressed are based on experimental results at the Forestry Research Institute of Sweden and other material, also on consultations between the author and L. Tirén and B. Lindquist.

## VEGETABLES 635

1512. Bugakov, A. 635:575(47)
(**The creators of new varieties**).
Socialističeskoe Zemledelie (Socialist Agriculture) 1944 : No. 119 : p. 2.
A brief account is given of work carried out at the Gribovo Selection Station, founded in 1920 at a state farm in the vicinity of Moscow. Many varieties of vegetables and horticultural fruits, now widely grown in the U.S.S.R., have been developed at this station, which produces annually 75% of all the élite vegetable seeds used in the Russian Socialist Federated S.R.

1513. 635:575(47)
Frolov, I. 635–1.531.12(47)
(**Experiments at the State farm, "Lesnoï"**).
Sovhoznoe Proizvodstvo (State Farming). 1944 : No. 8–9 : 29–30.
This article describes the results of variety trials in which potatoes, tomatoes, carrots, table beet, onions and other vegetable crops were investigated. Seed production was the subject of enquiry as regards carrots and beet; carrot crowns were made to produce seed, the yield of which was equal to that of seed grown in the normal way. Varieties are being improved by means of selection. The soaking of beet seed before sowing doubled the yield of roots.
The quality of tobacco seed of the varieties Tyn-Kulas and Dubec was improved by breaking off up to 50% of those seed capsules formed towards the latter part of the season. I. Z.

1514. Zinn, F. 635.13:581.6:581.4:578.08
Zur Methodik der Bestimmung der Wurzelform, des Herz-Rinden-Verhältnisses und des Zuckergehaltes bei Möhren. (**The technique of determining the root shape, the core-cortex ratio and the sugar content of carrots**).
Z. Pflanzenz. 1944 : **26** : 119–26.
Tables are given showing the variation exhibited by German carrot varieties in area ratio or QF (area of longitudinal section of the root apex/area of the rectangle which would completely enclose this area), and in ratio number QL (total length/maximum diameter). The same varieties were also investigated for the core-cortex ratio H : R (weight of core/weight of cortex), both for the whole carrot and for the apex; the two values were found to be closely correlated. A comparative study of the glucose and sucrose contents of both the core and the cortex showed that these four values were also closely correlated.

1515. Hagiwara, T. and
Kusamitu, H. 635.31:577.8:578.08
(**Distinction of males and females in *Asparagus* by using a solution of potassium chlorate**).
Agric. Hort. 1939 : **11** : 990–92.
[From Jap. J. Bot. 1940 : **10** : No. 4 : p. (38) : Abst. 142].
Yamasaki's method of identification was used. It consisted in the cultivation of shoots from male and female plants in tap-water for two days, after which they are put in a 0·02% solution of potassium chlorate and placed in the dark for 1–2 days, then placed again in tap-water and exposed to sunlight near the window for two days. Ultimately the male shoots were found to have faded but the female plants had remained as healthy as the controls.
Greater resistance to the action of potassium chlorate by female plants has also been recorded in *Fragaria* (Yamamoto) and papaya (Sisa and Kodaira).

1516. Poole, C. F. and
Grimball, P. C. 635.34:575(73)
**Ringing in the vitamins.**
Sth. Seedsman 1944 : **7** : No. 1 : 11, 46.
Huguenot and Madison are new strains of cabbage developed in South Carolina which are characterized by cold resistance, non-bolting habit, compactness of head, good quality and high ascorbic acid content at all seasons. Huguenot has been obtained by selection of round headed plants from a cold resistant pointed plant of the variety Charleston Wakefield. Madison has been produced by selection from Wisconsin Ballhead. Breeding methods are briefly described.

1517. 635.34:578.08(73)
Boswell, V. R. 635.34–2.484–1.521.6(73)
**Commercial cabbage culture.**
Circ. U.S. Dep. Agric. 1933 (Revised 1945) : No. 252 : Pp. 60.
This bulletin gives a general account of cabbage culture throughout the United States, and includes a description of the chief varieties, classifying them according to their susceptibility or resistance to yellows.

1518. Wheeler, W. 635.52(73)
**Why not have the best in lettuce?**
Horticulture 1943 : **21** : p. 457.
The qualities of the following American lettuce varieties are described: the Iceberg strains including the variety Great Lakes; Cosberg (from Cos x Iceberg); the butterhead types, including Wayahead, May King, Big Boston, Tennis Ball, Crisp as Ice and Mignonette; the Cos varieties Paris White (= Trinon) and Dark Green; Matchless; Bibb; and Oak Leaf.

1519. Pollard, L. H. and
Wann, F. B. 635.53–2–1.521.6:581.6(79.2)
**Variety studies give information on yields and other characteristics of celery strains.**
Fm Home Sci., Utah 1945 : **6** : No. 1 : 6–10.
Variety trials in Utah are reported. The vitamin C and total sugar content of several varieties were also determined. Observations of susceptibility to heart-burn indicate that strains of Utah are attacked by the disease whereas Pascal varieties remain free.

1520. Černyšev, D. 635.615:575.3
**(The fodder watermelon).**
Sovhoznoe Proizvodstvo (State Farming) 1944 : No. 3 : 24–25.
This plant can be fed to stock either fresh or, as in the Stavropolj area, ensiled with straw, which has to be added because the fruit contains 90 per cent of water.
It was found that seeds taken out of the upper or distal end of the fruit, when sown, resulted in more vigorous foliage, more fruit, and higher yield than seed from the middle and lower portion.
I. Z.

1521. Yeager, A. F. 635.64(73)
**Do you know tomatoes?**
Nat. Hort. Mag. 1945 : **24** : 126–27.
A popular account is given of the diversity of tomato varieties. The two South American species, *L. hirsutum* and *L. peruvianum*, are also described, which may be valuable in breeding.

1522. Frimmel, F. v. and
Lauche, K. 635.64:575"793"
Neue Wege der Züchtung auf Frühreife der Tomaten. (**New ways of breeding tomatoes for early ripening**).
Z. Pflanzenz. 1941 : **24** : 374–82.
Morphologically early varieties of tomatoes are those in which the first flower is carried low on the stem, e.g. at the 10th node. Late varieties may carry their first flower at, for instance, the 17th node.
Existing early varieties have relatively few flowers per truss, so that the number of fruits ripening early is small. Some late varieties, e.g. Prinz Borghese, have forked inflorescences, giving a very

large number of fruits per truss. It is suggested that by crossing these with early varieties, types which are early ripening and which have a large number of fruits on the first truss can be developed, thus increasing the amount of fruit available for the early market.
Stress is laid on the importance of working with large numbers of plants. It has been found satisfactory to space the plants at 30 × 15 cm. until the node number of the first flower has been determined. The early ripening plants can then be rigorously selected and replanted at a normal spacing. S. E.

1523. Powers, L. 635.64:575.125
**Relative yields of inbred lines and $F_1$ hybrids of tomato.**
Bot. Gaz. 1945 : **106** : 247–68.

Extensive details are given of the heterotic qualities of $F_1$ tomato hybrids, the following characters receiving special attention: total fruit yield, number of ripe fruit per plant, individual fruit weight, maturation time, plant spread, plant height, number of fruit locules, and weight per locule. The varying degrees of dominance and heterosis observed for these various characters are described and correlated.

1524. Leslie, W. R. 635.64:575.125(71.27)
**Manitoba news letter.**
N. S. Dak. Hort. 1945 : **18** : 52, 60.

A brief, popular discussion is given of the use of $F_1$ hybrid tomatoes.

1525. Shifriss, O. 635.64:575.125(73)
**Hybrid tomato.**
Sth. Seedsman 1945 : **8** : No. 4 : 15, 26, 30.

Fordhook is the first commercially produced hybrid tomato. The hybrid has a wide range of adaptability, and is almost as early as Earliana and continues to bear for a longer period. The fruits are uniform, smooth and medium sized. In the South the hybrid has yielded 25% more fruit than Marglobe. The method of hand pollination used is described, and the factors affecting fruit size are briefly discussed.

1526. 635.64:575.42(74.9)
**Science helps tomatoes.**
N. J. Agric. 1944 : **26** : No. 5 : 2–3.

Emphasis is laid upon the importance of keeping a variety uniform by careful selection after its introduction. The work of maintaining and improving the variety Rutgers since its release in 1934 has been carried out at the Rutgers Experiment Station. Individual plant records are used as the basis of selection.

1527. Hontschik, A. 635.64:581.4
Beitrag zur Morphologie der Tomate. (**Contribution to the morphology of the tomato**).
Z. Pflanzenz. 1944 : **26** : 127–35.

A study has been made of the morphology and ontogeny of the vegetative shoot and inflorescence of the tomato. Varietal differences in these characters may be important and it is thought that the findings presented should be of value to plant breeders.

1528. Foster, H. H. 635.64–2.48–1.521.6:575(76.2)
**Preliminary report on certain tomato lines, selections and varieties, under observation at the Mississippi Truck Crops Branch Station.**
Plant Dis. Reporter 1945 : **29** : 396–400. (Mimeographed).

A report is given of the results of tests, under conditions in Mississippi, of new unnamed disease resistant lines developed at five different experimental stations, and of 16 named varieties, including Rutgers and Pan America. Certain lines exhibited high resistance to *Fusarium* wilt, but a general susceptibility to the leaf blights, *Alternaria Solani* and *Septoria Lycopersici*, was found.

1529. Alexander, L. J. and
Tucker, C. M. 635.64–2.484:576.16:631.521.6:575.11(73)
**Physiologic specialization in the tomato wilt fungus *Fusarium oxysporum* f. *lycopersici*.**
J. Agric. Res. 1945 : **70** : 303–13.

In Ohio a race of *F. oxysporum* f. *Lycopersici* has been isolated with a distinct pathogenicity. A comparison has been made of the pathogenicity of mixtures of isolates from Ohio and two other sources. It was found that various tomato lines resistant to the previously studied isolates from other sources may be completely susceptible to the Ohio race. The presence of a number of complementary genes, in addition to the single factor determining resistance to the previously studied races, appears to be necessary for resistance to the Ohio race.

1530. Burkholder, P. R. and
McVeigh, I. 635.65:577.16
**Vitamin content of some mature and germinated legume seeds.**
Plant Physiol. 1945 : **20** : 301–06.

Data are given on the content of thiamin, riboflavin, pyridoxine, niacin, pantothenic acid, inositol, vitamin $B_c$, biotin and ascorbic acid in the seeds of one pea variety, one variety of *Phaseolus aureus* and seven varieties of soya bean. Conspicuous increases in the content of niacin, riboflavin and ascorbic acid occur during sprouting.

1531. Ligon, L. L. 635.652(76.6)
**Mungbeans. A legume for seed and forage production.**
Bull. Okla. Agric. Exp. Sta. 1945 : No. 284 : Pp. 12.

An account is given of the two chief types of mung bean (*P. aureus*), "golden" and "green", and of selections of the green variety, the uses of the mung bean and its adaptation, and the results of yield tests in Oklahoma. In general, the yield of green forage or hay of the golden variety was twice that of the green, but the green variety produced four to eight times more seed.

1532. Riollano, A. 635.652:575(72.95)
El mejoramiento de nuestras habichuelas (Datos preliminares). [**The improvement of our beans. (Preliminary data)**].
Estac. Exp. Agríc. Dep. Agron. Puerto Rico 1944 : No. 25 : Pp. 4. (Mimeographed).

Varieties imported from the United States of America have proved consistently inferior to the native varieties or selections in both yield and resistance to the main pests and diseases. The four best have been chosen from 63 selections under observation. Another very high yielding line has been selected from among varieties imported from Santo Domingo. This selection, A–37, has surpassed all others in yield in certain areas. This and selection 1160 have proved to have higher protein contents than all other varieties or selections and are being distributed among the growers. Work with the other selections is also being continued.

1533. Jensen, J. H. 635.652:575(78.2)
**The Scottsbluff Pinto bean.**
Circ. Neb. Agric. Exp. Sta. 1944 : No. 78 : Pp. 6.

Scottsbluff is a new variety selected from a cross between Great Northern and the common pinto bean. It shows no outstanding disease resistance, but its vigour, earliness, yield and quality are superior. It is considered to be a valuable variety for cultivation in western Nebraska on both irrigated and non-irrigated land.

1534. Caldwell, J. S.,
Culpepper, C. W.,
Hutchins, M. C.,
Ezell, B. D. and
Wilcox, M. S. 635.652:581.6
**Studies of varietal suitability for dehydration in snap beans.**
Canner 1944 : **99** : No. 9 : 13–15, 22; No. 10 : 12–15, 30; No. 11 : 16–18, 30; No. 12 : 17–18, 38, 40.

An investigation has been made of the suitability for dehydration of 40 varieties and strains of dwarf and runner beans. Samples of each of the varieties at two or more stages of maturity were dehydrated by a standardized method.

Information is given with regard to the fresh samples of each variety at the various stages of maturity. This includes average weight per pod and per individual seed, weight of seeds as percentage of total weight of pod, total solids content of pods, and their ascorbic acid content. The latter varied widely with variety and also with the stage of development within a variety. Varieties were found to be divisible into three groups on the basis of ascorbic acid content: a high group with a content ranging between 30 and 41 mg. per 100 grm., a medium group with a range of 20 to 29 mg., and a low group with less than 20 mg.
The comparative desirability of the varieties as dehydrated products was determined by the scoring of data on colour, general appearance, texture and flavour at each stage of maturity. On this basis the varieties were classified into four groups. A total of 23 of the varieties and strains gave dehydrated products that ranked as excellent or very good. Varieties placed in the third and fourth groups are considered to be unsuitable for commercial dehydration.

1535. 635.655:581.48:575–184
DOMINGO, W. E. 635.655:581.45:575.061.1
**Inheritance of number of seeds per pod and leaflet shape in the soybean.**
J. Agric. Res. 1945 : **70** : 251–68.
The inheritance of seed number per pod and shape of leaflet has been studied in 26 crosses between parents with different numbers of seeds per pod and different types of leaflet. The data indicate that the number of seeds per pod, while to some extent influenced by environmental conditions, is largely controlled by a few major genes and several minor ones. One allelomorphic pair of major genes is designated *Lolo*. *Lo* exhibits a considerable degree of dominance over *lo*, *Lolo* producing an intermediate number of seeds per pod and *lolo* resulting in a low number. The gene pairs *OO* or *Oo* produce normal leaflets, and *oo* oval leaflets. The gene pairs *NaNa* and *Nana* produce normal leaflets, while *nana* results in narrow leaflets. The $F_2$ population of crosses between plants with narrow and oval leaflets segregated in a ratio of 9 normal : 3 oval : 4 narrow. The gene *na* is epistatic to *o*. Linkage is shown between the genes *Oo* and *Lolo*, and between *Nana* and the genes determining high number of seeds per pod.

1536. DORCHESTER, C. S. 635.655:581.48:581.143.7:582(73)
**Seed and seedling characters in certain varieties of soybeans.**
J. Amer. Soc. Agron. 1945 : **37** : 223–32.
Seed and seedling characters have been studied in 27 varieties with a view to establishing a means of identifying the different varieties. Identification on the basis of seed characters only was found to be difficult if not impossible. Characters of leaf shape may be used in several instances to distinguish a variety from others having similar seed characters. In two cases mesocotyl colour is a useful means of distinction.

1537. HARRINGTON, C. D. 635.656–2.7:576.16(73)
**Biological races of the pea aphid.**
J. Econ. Ent. 1945 : **38** : 12–22.
The occurrence of physiological races of the pea aphid has been demonstrated.

1538. BEATTIE, J. H. 635.67:575.12(73)
**Growing sweet corn for the cannery.**
Fmr's Bull. U.S. Dep. Agric. 1945 : No. 1634 : Pp. 18.
Descriptions are given of yellow and white grained hybrids suitable for canning purposes. A small but important part of the sweet corn canning crop is produced from open-pollinated white grained strains, the most important varieties being Country Gentleman and Stowell Evergreen.

1539. BRUNSON, A. M. and
SMITH, G. M. 635.677:575.12(73)
**Hybrid popcorn.**
J. Amer. Soc. Agron. 1945 : **37** : 176–83.
The possibilities of improving popcorn are discussed. Hybrids of popcorn have been produced which have given an average increase in yield over a three-year period ranging from 9 to 68% in comparison with open-pollinated varieties. The hybrids have also shown better standing ability and popping expansion. The best hybrids have been produced from single or three-way crosses between inbred lines of Supergold, a yellow pearl variety, and a South American line SA 24.

# BOOK REVIEWS

5:016

**Catalogue of Lewis's Medical, Scientific and Technical Lending Library,** Part I and Part II.
H. K. Lewis and Co., Ltd., London 1943 (1944) : Price : to subscribers 12s. 6d., to non-subscribers 25s. : Pp. 928.

Revised to the end of 1943, this catalogue is divided into two main parts: I Authors and Titles; II A Classified Index of Subjects, based on the names of authors who have written upon them.
The arrangement and set-out is excellent and any publication in the library of which either subject or author is known to the enquirer can be found with ease. The subject index also informs us of the amount of material available on a particular subject with dates of the relevant works cited.
Botany includes the headings: Alpine, British, Pathology, Physiology, Anatomy, as well as publications on the general and on the practical aspects of this science.
Agriculture is represented by sections on various aspects of farming including: Farming, Animal Husbandry (Nutrition, Livestock), Chemistry and Bacteriology, Crops and Pastures, Fruit and Vegetables, Machinery, Soils and Manuring; and some publications on Tropical Agriculture.
There is also a section on Biology.
If in future editions the titles were to include information on the number of pages in the various publications the value of the catalogue would be further enhanced.

MOORE, A. R. 57:1

**The individual in simpler forms.**
University Press, University of Oregon, Eugene 1945 : $1.25 : Pp. x + 143. 9 figs. 4 tables. 13 plates.

Lurking inevitably behind the many problems of biological science, and forcing itself to the fore after every fresh advance in biological theory is the ancient question as to what constitutes the nature of individuality. This question, which has engaged the closest application of the Greek philosophers, the medieval schools, the later idealists and the modern materialists and realists, continually intrudes into biological discussion, and the more so as the bulk of factual knowledge increases.
There are those that would assert that the whole notion of individuality is wrongly applied to organisms, being attributed to them by a false analogy with the human mind, which regards itself as a discrete being, separate both from its environment and from other minds; others would allow the attribution, and would be content to regard the higher animals at least, and the more simply constructed plants such as annual herbs, as individuals; while still others, pointing out that the constituent parts of organisms are characterized by a certain autonomy, would predicate individuality of such structures as cells, the branch systems developed from a single bud, or the hypothetical units employed by the "phyton" theory. None of these points of view, however, are tenable as they stand today, and any further contribution to this vexed question is to be welcomed.
Professor Moore's treatise does not claim to cover more than a fraction of this field, but his treatment, dealing as it does with the results of experimental physiology in the lower animals, will provide much unfamiliar information to botanical readers. He presents a detailed account of the nature of cytoplasm and its role in fertilization and subsequent development, and follows this by considering the physico-chemical factors bringing about embryological changes and the consequent loss in the totipotency of the separate cells. Next, the differing degrees of complexity exhibited by the nervous system are described and are classified into three classes of increasing complexity: "the aganglionic type", as in the star-fish, the "head ganglion" type of some marine worms, and the "chain ganglion" type of the Arthropoda.
These examples are cited to show that biological organisms are to be found at varying levels of complexity, and this complexity, moreover, is correlated with an increase in the capacity for autonomous activity. This latter property the author appears to regard as an essential note of individuality, and since autonomy admits of degrees, so also, it would seem, does individuality.
In a final chapter, a short excursus on the physiological basis of psychology is given, and this is perhaps the least happy section of the book. A questionable distinction of kind is drawn

between simple hysteresis (an effect remaining in an organism after some stimulus) and associative hysteresis (a conditioned reflex to some signal "learned" by association). The latter is believed to characterize only those organisms with a central nervous system, and moreover to be indicative both of memory and of mind. This abrupt transition from the physiological to the cognitive order certainly needs more justification than is here given to it, and is hardly resolved by an elucidation of the physiology of conditioned reflexes.

None the less, the well-ordered body of data presented by the author is of considerable value in demonstrating the relationship between morphological and physiological complexity, on the one hand, and the degree of autonomous behaviour exhibited, on the other.

It still remains to fit these findings into an adequate conceptual framework relating to the root problem of individuality. A few remarks on the vitalist and materialist standpoints are included by the author, but these hardly contribute to the issue under question.

*Lukin, E. I. 576.12:581.9:575.1

**(Darwinism and geographical trends in the variation of organisms).**

Izdateljstvo Akademii Nauk S.S.S.R. (U.S.S.R. Academy of Sciences Press) Moscow and Leningrad 1940 : Pp. 311. Tables.

It is now becoming generally realized that the development of genetics in the U.S.S.R. has been along somewhat individual lines, at least since 1930. Furthermore, in Russia itself, there appears to be not one but several schools of thought diverging upon points quite fundamental in genetical theory. In particular, the theories put forward by botanists and zoologists seem to differ considerably, the former veering towards the Marxian genetics of Lysenko, while the latter tend to proceed more along neo-Darwinian lines. In view, however, of the exceedingly rapid change-over in the attitude of Russian biologists during the last few years, it would be rash to attempt any assessment of the general consensus of opinion on genetics in the U.S.S.R. today. In 1940, when the book under review was published, neo-Darwinism was certainly widely accepted by zoologists and botanists, but now, this viewpoint has lost many of its adherents so that it is impossible to say what section of the scientific community would assent at present to the views here expressed.

The book gives an interesting exposition of the tenets of neo-Darwinism and their application to the problems of geographical distribution, taxonomy and evolutionary theory. Especially interesting are the mentions of Russian authors whose contributions are not well known in western Europe. A preliminary account is given of the views of Darwin himself and of the neo-Darwinians Schmidt, Sumner, Bauer, Komarov, Ivanov, Sinskaja and Rozanova, also of the closely allied systems of Turesson and Goldschmidt. Unsympathetic reference is made to the orthogenetic tendencies discoverable in the writings of Wagner, Kleinschmidt, Wolteneck, Koržinskiĭ and Berg, and to the neo-Lamarckian trends of Wettstein, Serebrovskiĭ, Stančinskiĭ and Rensch.

A valuable collation is made of the evidence furnished by Russian authors in favour of neo-Darwinism, including also reference to the work on population genetics undertaken by Dubinin and Timoféef-Ressovsky, and the copious information furnished by investigations of the World Collection of the All-Union Institute of Plant Industry. Theoretical discussions on the formenkreis, rassenkreis, geographical race and ecotype receive due consideration.

For western readers, familiar with the standard works of Huxley, Dobzhansky and Goldschmidt, this book contains little that is unfamiliar, but the references to Russian observations and the information it casts on one aspect of genetical opinion in the U.S.S.R. during 1940 will suffice as a recommendation.

Knaysi, G. 576.3:632.3

**Elements of bacterial cytology.**

Comstock Publishing Company, Inc., Cornell University, Ithaca, N.Y. 1944 : Pp. xii + 209. 91 figs. 19 tables. X plates.

It would be difficult to imagine a less promising subject for a textbook than bacterial cytology and if one approached this book purely from the standpoint of the student of the cytology of the higher plants and animals, one would be tempted to say that "it is not well done, but the wonder is that it can be done at all". To do so would be to criticize the book for not being what

* An abridged translation of this book is on file at the Bureau.

it does not pretend to be. The author's aim is set out clearly: "Knowledge of the structure of the bacterial cell should be an integral part of the training of every modern bacteriologist". The difficulty is, of course, that owing to the smallness and diversity of the material, bacterial cells, the purely descriptive stage of this branch of biology is still only developing. The techniques used, including new staining procedures and dark field, ultra-violet and electron microscopy, are advanced, but the subject, owing to its inherent difficulties, advances slowly, far behind other branches of cytology.

The author has performed a valuable service to biologists in general as well as to bacteriologists, in giving as clear a picture as he has of the present state of our knowledge of bacterial cytology. The book is mainly devoted to the bacteria proper, physiological as well as morphological aspects being covered. There are also chapters on the Actinomycetes, the Spirochetes and the Myxobacteria. A large bibliography and a subject index are provided. Ample illustrations are given, a noteworthy feature being the abundance of electron-microscope photographs. A disappointing feature of the illustrations is the failure to give indications of the magnification used. J. L. F.

Castetter, E. F. and
Bell, W. H. 58(78.9)
**Pima and Papago Indian agriculture. Inter-Americana studies I.**
University of New Mexico Press, Albuquerque, N. Mex. 1942 : $3.50. Pp. xv + 245. 5 figs.

This book forms the first of a projected series published by the School of Inter-American Affairs of the University of New Mexico "bearing on Latin America and the American Southwest". It represents the results of three years' field study by the authors, supplemented by other data obtained from the literature.

Though both authors are botanists (one imagines that the ideal combination would be one botanist and one ethnologist) they have not confined themselves strictly to the botanical standpoint but have dealt with the problem from its ethnological aspects also. The book illustrates the excellent results that can be obtained from a very intensive study of a relatively small area over a long period of years and by many investigators. Unfortunately few other primitive cultures are sufficiently close to civilization on the one hand or undisturbed by it on the other to allow of similar studies being made on them. It is to be hoped that the other books in this series will maintain the high standards set by the one under review. J. G. H.

Rodgers, A. D. III 58:007(73)
**John Merle Coulter—missionary in science.**
Princeton University Press, N.J. 1944: $3.75 Pp. viii + 321. photos.

This biography gives an account of the life and works of J. M. Coulter (1851-1928). The plan of the book is mainly, though not strictly, chronological, with breaks where the author pauses to sketch in the background of the developing plant sciences and arts. Coulter's scientific career appears to have had two main periods. The first period was characterized by active scientific work mainly in the fields of taxonomy and morphology, the best known being probably his work on the Gymnosperms. During this period the systematic knowledge of the North American flora, started by the early American botanists, was filled in and consolidated. The second period was characterized more by administrative and expository work and corresponds roughly with the great growth of the more dynamic and experimental aspects of botany. Though not distinguished by outstanding originality Coulter undoubtedly had a very successful career in botany and in presenting a detailed picture of this career, the author has made a useful contribution to the history of botany. It is only fair, however, to warn the reader that defects of construction and of appraisal of scientific work, result in the book being more useful as a quarry for facts than as a balanced and readable historical study. With this reservation, the book can be recommended to all who are interested in the history of botany (which *should* include all botanists), the period it covers being of critical importance in the development of modern botany. Plant breeders will note that there are frequent references to their activity and may glean some facts about the interaction between academic botany and their own, more practical, branch of botany. J. L. F.

JONES, G. N. and
JUST, T. (Editor) 581.9(77.3)
**Flora of Illinois. Containing keys for identification of the flowering plants and ferns.**
American Midland Naturalist Monogr. No. 2. University Press, Notre Dame, Ind. 1945 : $4.00. Pp. 317. illus.

In a book of some 300 pages it is clearly impossible to treat adequately the flora of an area as varied and as large as the State of Illinois. The author has preferred, rather, to confine himself to providing dichotomous keys for the identification of the flowering plants and ferns and has added a few notes on the distribution of each species.

A short introduction outlines the main vegetational divisions to be found in the State. The book contains two maps, a glossary, bibliographies and indexes of authors and plant names.

J. G. H.

CARTER, G. F. 581.9:576.16(73)
**Plant geography and culture history in the American Southwest.**
Publications in Anthropology, Viking Fund, New York 1945 : No. 5 : $1.50. Pp. 140. 27 figs. 6 tables.

The possibility of using the domestication of plants as a key to problems of cultural origins is relatively unexplored; the distribution of domestic plants has usually been studied from the agronomic viewpoint, and the anthropologist or archaeologist has but rarely possessed the requisite botanical knowledge for the elaboration of ethnological hypotheses which are fully acceptable when examined in the light of certain fundamental laws of plant geography and genetics.

This thesis presents the results of a comprehensive study of domestic plants in Southwest America, viz., the cucurbits, maize, the tepary and kidney beans and certain minor crops, and the conclusions reached directly on the basis of this botanical evidence in relation to the main ethnological problems of Southwest or North America. Two seasons of field work were undertaken, in which extensive crop collections were made, and practically all the agricultural Indians of the Southwest were informally interrogated concerning old and recent crops and methods of cultivation; in addition, many museums were visited, and the literature dealing with the ethnology of the Southwest, Eastern and Northern United States has also been examined.

The conclusion is reached that the Southwest is divisible on the aboriginal level into two distinct areas, characterized by crops consisting of different species or varieties, the Gila-Sonora region (Pima and Papago peoples), and the Anasazi or Plateau region (Basket Maker-Puebloan peoples) which is further subdivisible into five areas. These two main agricultures go far back in time, and are found to be identical with the various cultural divisions. The plant distributions are interpreted as providing substantial evidence that the Gila-Sonora agriculture came up the west side of Mexico and that the Basket Maker and Puebloan agriculture reached the Great Plains region, and eventually the Southwest, by way of eastern Mexico. It is further postulated that this eastern Mexican corridor functioned most actively over a considerable period and was much more important to prehistoric cultural developments in the United States than the western corridor. One conclusion is particularly important. The agriculture of the Southeast and of the Hohokam people is shown on the basis of the evidence of crop distribution to be clearly of older origin than the Basket Maker culture—usually regarded as the earliest culture in the United States. The Southwest thus emerges as a marginal area into which agriculture penetrated late in the history of the Americas. In considering the development of agriculture the author stresses the necessity of recognizing the great length of time required for plant adaptation resulting in domestication, especially in view of the fact that in the geographical diffusion of plants only a limited number of fairly constant types appear to spread, thus imposing a limiting factor upon the wealth of genetic variability available for the primitive development of crops.

An original method of approach to problems of plant geography and cultural history has led to the discovery of valuable facts; conclusions have been drawn which suggest that certain hitherto widely accepted postulates and speculative dates may be in need of fundamental revision.

633(48.1)

Nyttevekstboka. (**A book of useful plants**).
Nyttevekstforeningen, Øystese Trykkeri 1942 : Pp. 356. figs. photos.

Published by the "Useful Plant Association", with financial aid from the Agricultural Department, this handbook deals in separate chapters with fibre plants, herbs, salads, medicinal plants, edible mushrooms, mosses and lichens, vegetable dyes, tobacco, willows and artichokes and contains articles by various writers on the following subjects of direct economic importance under war conditions—Industrial products from seaweed; Norwegian substitute plants; Sugar beet cultivation; Hop production; Wood fuel; The Vitamins in economic plants; and The collection, storing and sale of useful plants.

The book contains numerous illustrations, and references to relevant literature are appended to many of the chapters. A general index (12 pages) concludes this useful and practical manual, which incidentally provides students of Norwegian botany with the Latin and Norwegian equivalents for many plant names.

Kirchner, O. von,
Loew, E. and
Schröter, C. 633:581.5

Lebensgeschichte der Blütenpflanzen Mitteleuropas. (**Life history of the flowering plants of central Europe**).
Strasburg : 4 volumes (incomplete).

Sixty-two Lieferungen of this monumental treatise have now appeared, and it is to be hoped that the completion of the whole work, which began coming out in the first decade of the present century, will not be delayed much longer. A very wide field of botanical investigation has been covered by the authors and their successors, the object of their work being the collation of all available information on the ecology, geographical distribution and morphological adaptation of the flowering plants of Germany, Austria and Switzerland. The bulk of the work is taken up with a systematic and comparative account of the various species arranged under their families. Illustrations are abundant and each section is well documented. The numbers received in this country since the War deal with the following families: Callitrichaceae, Empetraceae, Euphorbiaceae, Geraniaceae, Leguminosae, Loranthaceae, Lythraceae, Monotropaceae, Moraceae, Myricaceae, Nymphaeaceae, Orchidaceae, Oxalidaceae, Plumbaginaceae, Salicaceae, Tiliaceae, Ulmaceae and Urticaceae.

As a work of reference, this work should prove invaluable for many years to come.

Haugum, O. 633.1:582(47.1)

Våre kornsorter. En beskrivelse av de alminneligst dyrkede sorter. (**Our cereals. A description of the most commonly grown varieties**).
C. Dahls Bok- and Kunsttrykkeri A/S, Oslo 1940 : Pp. 29. 3 tables.

The survey contained in this useful and informative booklet gives short descriptions of the cereals—both old and recent varieties—most commonly used in Norwegian trials, the results of which have been published in official sources and in reports in scientific journals. After each description relevant bibliographical references are given.

Other information set out includes the dates of release to the trade and observations on quality, growth period and the productivity in suitable districts.

The variety used as the control for each of the various cereals is given at the beginning of each group which is then arranged alphabetically. Scandinavian and foreign varieties including land forms are found in each section.

Three comparative tables showing results for a series of experiments on oats, barley and wheat respectively are appended.

Lathouwers, V. 633.11:575

Manuel de l'amélioration des plantes cultivées. Tome II. L'amélioration du froment. (Cytologie, morphologie, physiologie, génétique, phylogénie). [**Handbook of the improvement of cultivated plants. Vol. II. The improvement of wheat. (Cytology, morphology, physiology, genetics and phylogeny).**].
Librairie Agricole de la Maison Rustique, Paris 1942 : Pp. xvi + 579. tables. 66 figs.

In 1924 the first edition of this Handbook appeared in a single volume. In 1929 was issued the

first volume of a new and enlarged edition devoted to a general survey of the subject of plant improvement which was to be followed by a second volume on specialized improvement. The rapid growth of the subject however necessitated a division into a number of volumes, the first being devoted entirely to wheat. Here again various factors contributed to delay its appearance but the delay has been turned to advantage as it has enabled the author to add an addenda of more than 200 pages with the addition of the literature up to 1940. The work is divided into five main sections; the first deals with the aims of improvement and the genetical behaviour of the main characters of wheat. The second includes classification, centres of origin, interspecific and intergeneric hybridization. Mutations, xenia, and floral biology are covered in the concluding sections. Each section is amplified and brought up to date in the addenda and the literature includes nearly 2000 titles. R. M. I.

633.61:519(68)
633.61:575(68)

**The South African sugar year book 1943-44.**
Published by South African Sugar Journal, Durban : 5s. Pp. 199. Tables. Illus.

General misunderstanding has evidently existed in the Union for a number of years regarding the economic position of the South African sugar industry. An important survey is therefore presented with the object of meeting long standing criticism, giving all the available facts and statistics of the production and disposal of sugar in South Africa since the Great War, in relation to world marketing conditions. It is emphasized that the production of sugar in the Union is an economically sound undertaking under integrated control and that the criticized participation in the world markets has been fully justified. Other contributions include, in addition to the various annual reports, "U.S.A. and the world sugar production", a forecast by O. H. Lamborn, and a paper entitled "Sugar in the Post War World" by O. W. Willcox, dealing with the future machinery of equitable international control.

Since 1935 fresh impetus has been given to production by the replacement of Uba by new variety canes, as a result of which 4,181,973 tons of sugar were milled in 1936, rising to 5,346,006 tons in 1939, as compared with 3,867,551 tons in 1935. A comprehensive report is given of work at the Experiment Station of the South African Sugar Association. Two sources of new varieties are available, viz., the introduction of commercial varieties from other countries, and, since sugar cane does not produce seed in Natal, the raising of seedlings from imported seed. As a result of observations of imported established varieties, the following varieties have been released for general planting, Co. 281, Co. 290, Co. 301, Co. 331, P.O.J. 2714, P.O.J. 2725, P.O.J. 2727 and P.O.J. 2878; in the season 1943-44 the sugar crop was composed of 64% of Co. 281, 25% of other Coimbatore varieties and only 6% of Uba. The seedlings which show most promise are hybrids derived from *S. officinarum*, *S. spontaneum* and *S. Barberi*, or hybrids between *S. officinarum* and *S. Barberi*. Seedlings at present under study fall into four groups, viz., crosses between P.O.J. and Co. varieties, crosses between Co. varieties, nobilizations of Uba Marot, and heterogeneous material largely from uncontrolled crosses. Other investigations include the study of the sterility of the flower when produced, and tests of the reaction of new varieties to diseases. Under the new policy of the Sugar Association, research projects at the Station will in future be confined to strictly agricultural problems; the future of important technical research is discussed in the report of the addresses delivered at the 1944 Congress of the South African Sugar Technologists' Association.

MARTÍNEZ, M. 633.913(72)
Plantas huliferas. (**Rubber plants**).
Ediciones Botas, Mexico 1943 : Pp. 110. 12 illus.

The author deals with two Mexican rubber plants, *Parthenium argentatum* or Guayule, and *Cryptostegia grandiflora*, from the point of view of the grower and processer. Short notes are given for each plant on the distribution, botanical classification, insect pests, cultivation, propagation and methods of rubber extraction.

It would appear from the account that improved methods of cultivation and propagation are needed with Guayule, whilst the methods of rubber extraction in *C. grandiflora* stand in great need of improvement. Other Mexican rubber-bearing plants are also mentioned. J. G. H.

BENNETT, H. 66

**The chemical formulary. Volume VII.**

Chemical Publishing Co., Inc., Brooklyn, N.Y. 1945 : $6.00 : Pp. xxxii + 474.

Additional information of industrial chemical processes has been collected in a seventh volume, bringing "Chemical Formulary" up to date. The contents include many processes in which a wide range of plant products are utilized, under such sections as flavours and beverages, cosmetic and drug products, food products, plastics and resins. The latest volume continues to fulfil the usefulness of the "Chemical Formulary" as a ready source of the type of information which is largely scattered and thus difficult to acquire without often considerable expenditure of time and effort.

# INDEX


Åberg, E., 1408, 1413
Acuña, J. B., 1458
Afzal Husain, M., 1266
Aitken, T. R., 1237
Aitken, Y., 1298
Akeley, R. V., 1440
Akimoto, S., 1448
Akkoyunlu, Z., 1465
Albensky, see Aljbenskiĭ
Alexander, L. J., 1529
Aljbenskiĭ, 1507
Anderson, J. A., 1237, 1251, 1300
Andersson, G., 1377
Andres, J. M., 1401
Anonymous, 1215, 1217, 1219–20, 1228, 1232, 1240, 1256, [1262], 1265, 1269, 1279, 1307–9, 1314, 1335, 1384, 1396–7, 1437, 1449, 1466, 1468, 1511, 1526, p. 372, p. 376, p. 377
[Anson, R. R.], 1262
Arnold, H. C., 1218
Artemova, A., 1371
Arzuage, J. G., 1313
Atkinson, R. E., 1368, 1391
Atwood, S. S., 1427
Avakian, A., 1472

Bailey, L. H., 1499
Bald, J. G., 1261
Bamford, R., 1469
Batchelor, L. D., 1492
[Bawden, F. C.], 1235
Beachell, H. M., 1419
Beadle, G. W., 1352
Beasley, J. O., 1451
Beattie, J. H., 1538
Becker, H., 1382
[Beggington, A. G.], 1262
Beljskiĭ, A. Savčenko-, see Savčenko-Beljskiĭ, A.
Bell, W. H., p. 374
Bennett, H., p. 378
Bhatnagar, M. P., 1297
Black, M. W., 1284
[Black, W.], 1235
Blake, M. A., 1489
Blanchard, A. J., 1472
Bøgh, H., 1339
Bolsunov, see Bolsunow
Bolsunow, I., 1463
[Bond, W. E.], 1262
Boswell, V. R., 1517
Boyle, W. S., 1428
Brandl, M., 1312
Brown, B. A., 1423
Brown, B. M., 1249
Bruman, H. J., 1344
Brunson, A. M., 1539
Bugakov, A., 1572
Burkholder, P. R., 1530
Burlison, W. L., 1434
Burrell, P. C., 1333
Burton, M. G., 1455
Burton, W. G., 1260

Cabal Martinez, E., 1418
Caldwell, J. S., 1486–7, 1503, 1534
[Cameron, G. S.], 1262
Camp, W. H., 1500–1
Carabia, J. P., 1496
Carter, G. F., p. 375
Castetter, E. F., p. 374
Černyšev, D., 1520
Chakravarti, S. C., 1242
Chalkley, H. W., 1318
Chang-Chih Hu, see Hu Chang-Chih
Chapman, G. H., 1347
Charetschko-Sawizkaja, H., 1338, 1439
Chavarriaga Misas, E., 1311
Cheliadinova, see Čeljadinova
Chen, Shao-Lin, 1406
Chen, T.-Y., 1490
Chevais, S., 1323
Chiao, C. Y., 1420
Chien-Chi Wu, see Wu Chien-Chi
Chilton, S. J. P., 1351
Christensen, J. R., 1505
Chu, Vong-May, 1383
Churchill, B. R., 1369
Cicin, N. V., 1361–3, 1393
Clanahan, D. L., 1369
Clapp, A. L., 1400
Cockerell, T. D. A., 1227
[Cockerham, G.], 1235
Coe, F. M., 1502
Coelho, C., 1460
Coelho, M., 1460
Coghill, R. D., 1349
Conner, A. B., 1306
Cooper, J. F., 1436, 1495
Covas, G., 1505
Crane, J. C., 1458
[Crane, M. A.], 1235
Cranmer, C. B., 1494
Croizat, L., 1342
Culpepper, C. W., 1486–7, 1503, 1534

Dangeard, P., 1327
[Darlington, C. D.], 1235
Darrow, G. M., 1500
Datta, J., 1267
Davidson, O. W., 1489
Davies, A. F., 1259
Davis, C. D., 1400
Delbrück, M., 1345
Demerec, M., 1346
Devaux, H., 1330
Dillewijn, C. van, 1459
Dixon, T. F., 1222
Dobzhansky, T., 1302
Dodds, H. H., 1268
Domingo, W. E., 1535
Dorchester, C. S., 1536
Dove, W. F., 1440
Drahorad, F., 1367
[Ducker, H. C.], 1262

Eardley, C. M., 1257
Edgerton, C. W., 1351
Edmundson, W. C., 1443
Edwards, D. C., 1255
Elden, H. van, 1290
Emerson, S., 1319
[Evelyn, S. H.], 1262
Ezell, B. D., 1534

Fabergé, A. C., 1334
Fagerlind, F., 1340
Fang, C. T., 1379
Fassett, N. C., 1508
Fickendey, E., 1470
Fifield, C. C., 1373
Filippov, D., 1474
Finney, K. F., 1374
Fleischmann, R., 1395
Floor, J., 1291
Foster, H. H., 1528
Freisleben, F., 1412
Freisleben, R., 1316
French, A. P., 1483
Fries, N., 1231
Frimmel, F. v., 1522
Frolov, I., 1513
Frolova, S. L., 1385

Garber, R. J., 1360, 1427
Gardner, E. J., 1475
Gardner, M. E., 1445
Gauch, H. G., 1375
Ghose, R. L. M., 1267
Glick, D., 1366
Goenaga, A., 1467
Goodhue, L. D., 1333
Grandfield, C. O., 1431
Granhall, I., 1456
Gray, W. D., 1343
Greenstein, J. P., 1318
Greulach, V. A., 1337
Gries, G. A., 1375
Grimball, P. C., 1516

Haagen-Smit, A. J., 1403
Haasis, F. W., 1473
Hagiwara, T., 1515
Hanisch, H., 1370
Hanson, H. J., 1350
Hardison, J. R., 1422
Harečko-Savickaja, H., see Charetschko-Sawizkaja, H.
Harlan, J. R., 1421, 1424
Harrington, C. D., 1537
Haslam, R. J., 1274
Haughton, J. M., 1298
Haugum, O., p. 376
Heinisch, O., 1304
Herren, H., 1372
Heyne, E. G., 1400
Hill, A. V., 1229
Hill, D. D., 1275
Hirschhorn, E., 1358
Hoffmann, W., 1410
Hofmeyr, J. D. J., 1290
Holdsworth, M., 1294
Hollaender, A., 1322, 1349
Honecker, L., 1411
Hontschik, A., 1527
Horowitz, B., 1221

Hosszu, M. de, 1281
[Howard, H. W.], 1235
Hu Chang-Chih, 1491
Hull, R., 1270
Hasain, M. Afzal, see Afzal Husain, M.
Hutchins, M. C., 1534
Hutchinson, J. B. [1262], 1264
Hutton, E. M., 1261

Ignatiev, M. V., 1321
Igolen, G., 1336
Ikeda, M., 1484
Ipekoglu, F., 1465
Iyer, C. S. Venkitasubba, see Venkitasubba Iyer, C. S.

Jablokov, A. S., 1506
Jakovleva, W., 1371
Jakuškin, I. V. (Editor), 1363
[Jameson, J. D.], 1262
[Jenkin, T. J.], 1235
Jensen, I., 1339
Jensen, J. H., 1533
Joachim, A. W. R., 1272
Johnson, L. P. V., 1236
Jones, D. L., 1416
Jones, G. N., p. 375
Jones, J. W., 1419
Jurjev, V. Ja. (Editor), 1363
Just, T. (Editor), p. 375
Just, T. K., 1325

Karper, R. E., 1415
Keese, H. v., 1388
Khan, A. R., 1297
[King, H. E.], 1262
Kinman, M. L., 1398
Kirchner, O. von, p. 376
Kirpčnikov, see Kirpichnikov
Kirpichnikov, V. S., 1326
Knaysi, G., p. 373
[Knight, R. L.], 1262
Koch, L. W., 1247
Koller, P. C., 1226
Konstantinov, N. M., 1452
Konstantinov, P. N. (Editor), 1363
Kornilov, A., 1386
Krishnamurthy, K. V., 1280
Kusamitu, H., 1515

Lal, K. B., 1266
Landauer, W., 1324
Landis, B. J., 1443
Lathouwers, V., p. 376
Lauche, K., 1522
Leckie, W. G., 1241
León, H., 1496
Le Roux, M. S., 1292
Leslie, W. R., 1524
Levine, M. N., 1381
Ligon, L. L., 1531
Lindegren, C. C., 1355, 1357
Lindegren, G., 1355
Ling, L., 1296
[Lochrie, J. V.], 1262
Loegering, W. Q., 1381
Loew, E., p. 376
Löve, A., 1329
Löve, D., 1329
Lucas, G. B., 1351
Ludwig, W., 1316
Lukin, E. I., p. 373
Luria, S. E., 1348
Lynes, F. F., 1461

[MacDonald, D.], 1262
McHargue, J. S., 1464
MacKay, J. W., 1333
[McKinstry, A. H.], 1262
Macpherson, N. J., 1295
McVeigh, I., 1530
McWhorter, O. T., 1485
Manning, H. L. [1262], 1264
Manning, T., 1455
Manskaja, S. M., 1476
Mansurova, V. V., 1385
Manton, I., 1225, 1328
Marotta, F. P., 1310
Marshall, J. B., 1236
Martinez, E. Cabal, see Cabal Martinez, E.
Martínez, M., p. 377
[Mather, K.], 1235
Matsubara, S., 1484
Meader, E. M., 1489
Meier, K., 1305
Metzger, I., 1412
Miège, E., 1450
Miller, E. G., 1375
Miller, J. H., 1455
[Miller, W. L.], 1262
Millington, A. J., 1245
Mirošničenko, I., 1438
Misas, E. Chavarriaga, see Chavarriaga Misas, E.
[Mitchell, B. L.], 1262
Miyabayashi, T., 1493
Moats, R. W., 1472
Modlibowska, I., 1285
Moore, A. R., p. 372
Moore, J. H., 1453
Moreau, R. E., 1283
Morrison, F. R., 1293
Müller, K. O., 1444
Munsell, R. I., 1423
Murphy, E. F., 1440
Murray, D. B., 1282
Murwin, H. F., 1247
Myers, W. G., 1350
Myers, W. M., 1425

Nagao, M., 1394
Nandi, H. K., 1254, 1258
Narayana Rao, T., 1273
Neal, N. P., 1248
Nègre, E., 1354
Neubert, A. M., 1488
Nicholson, C., 1315
Nihous, M., 1331
Nott, J., 1276
Novikoff, A. B., 1301

Ozbek, S., 1479

Pal, B. P., 1273
Panditteseker, D. G., 1272
Panse, E., 1432
Parris, G. K., 1447
[Pearson, E. O.], 1262
[Peat, J. E.], 1262
Penfold, A. R., 1293
Perlberger, J., 1286
Piettre, L., 1441
Pisarev, V. E., 1363, 1405
Pohjakallio, O., 1433
Pollard, L. H., 1519
Poole, C. F., 1516
Popov, G. I., 1476
Powers, L., 1475, 1523
[Prentice, A. N.], 1262
Protzman, C. M., 1457
Pugsley, A. T., 1244

Quinby, J. R., 1417

Rabel, G., 1223
Raghaven, T. S., 1280
Raheja, P. C., 1289
Ramanujam, S., 1273
Ranganathan, B., 1233–4
Rao, T. Narayana, see Narayana Rao, T.
Rao, Y. Sundar, see Sundar Rao, Y.
Raper, K. B., 1349
Rapp, K. E., 1464
Rasul, C. K., 1278
Ratera, E. L., 1442
Reichert, I., 1243
Reiss, F., 1399
Renaud, J., 1353
Rhodes, W. E., 1259
Righter, F. I., 1510
Riollano, A., 1532
Roberts, O. C., 1483
Robinson, J. L., 1399
Rodgers, A. D., III, p. 374
Roemer, Th., 1359, 1378
Rogers, W. S., 1291
Romanov, V. A., 1414
Rosanova, M. A., 1497
Rozanova, see Rosanova
Rosen, H. R., 1389–90
Rounds, M. B., 1492
Roy, R. S., 1277
Rudorf, W., 1335
[Ruston, D. F.], 1262

Sakharov, V. V., 1385
Saltykovsky, M. I., 1376
Saprygina, see Sapryguina
Sapryguina, E. S., 1376
Sather, J. D., 1275
Saura, F., 1401
Savčenko-Beljskiĭ, A., 1317
Sawizkaja, H. Charetschko-, see Charetschko-Sawizkaja, H.
Schaal, L. A., 1443
Scheibe, A., 1303
Schmidt, R., 1445
Schröck, O., 1429
Schröter, C., p. 376
Schwarze, P., 1341
Scott, W. O., 1400
Sears, O. H., 1434
Sellke, K., 1444
Sen, B., 1242
Sen, S. N., 1216
Senaratna, J. E., 1271
Shank, D. B., 1402
Shao-Lin, Chen, see Chen, Shao-Lin
Shapiro, N. I., 1321
Shen, Shu-Min, 1406
Shifriss, O., 1525
Shu-min, Shen, see Shen, Shu-min
Simonet, M., 1336
Simmonds, A., 1287
Sims, H. J., 1239
Singh, M. P., 1277
Siu, R., 1403

Smit, A. J. Haagen, see Haagen-Smit, A. J.
Smith, G. M., 1539
Smith, W. H., 1288
Sonneborn, T. M., 1320
Southwick, L., 1483
Soutter, R. E., 1238
Spiegelman, S., 1355–6
Sprague, G. F., 1398
Stakman, E. C., 1381
Steere, W. C., 1471
[Stenton, R.], 1235
Stephens, J. C., 1417
Steuk, W. K., 1504
Stevenson, F. J., 1445
Stoa, T. E., 1454
Subramaniam, M. K., 1233–4
Sugawara, T., 1481
Sundar Rao, Y., 1299

Tai, M. C., 1296
Takasugi, S., 1409
Tang, P. S., 1406
Tatum, E. L., 1352
Tavčar, A., 1407
Tezima, K., 1484
Thomas, I., 1245
Thomas, J. A., 1323
Thomas, R., 1263
Toole, M. G., 1469
Tucker, C. M., 1529
Turbin, N. V., 1224
Tzitzin, see Cicin

Vaidya, V. G., 1253
Vallega, J., 1380
Vasconcélos, D. de M., 1462
Veldhuis, M. K., 1488
Venkitasubba Iyer, C. S., 1252
Vinogradova, N. M., 1405
Virtanen, A. I., 1230
Vong-May, Chu, see Chu, Vong-May

Wang, H. R., 1379
Wann, F. B., 1519
Warmke, H. E., 1477
Watson, M. A., 1270
[Weatherley, P. E.], 1262
Webster, G. T., 1364
Weiss, F., 1430, 1446
Wellington, B., 1478, 1480
Wells, J. G. (jun.), 1369
[Wells, W. G.], 1262
Werth, E., 1387
Westerman, B. D., 1372
Wettstein, F. von, 1335
Wettstein, W. von, 1509
Wheeler, W., 1518
Whitney, D. E., 1372
Wiebe, G. A., 1408
Wiidakas, W., 1404
Wilcox, M. S., 1534
Willard, C. J., 1435
Williams, C. B., 1235
Williams, C. F., 1498
Wilson, G., 1403
Witkus, E. R., 1332
Woodmansee, C. W., 1464
Woodward, R. W., 1365
Wu Chien-Chi, 1491

Yeager, A. F., 1521
Young, G. A., 1236
Yu, T. F., 1379

Zacks, M. B., 1246
Zazoev, M., 1426
Zinn, F., 1514
Zwintzscher, M., 1482
Zwoboda, A., 1392

# PUBLICATIONS
## of the
# AMERICAN SOCIETY OF AGRONOMY
## and of the
# SOIL SCIENCE SOCIETY OF AMERICA

---

### THE JOURNAL OF THE AMERICAN SOCIETY OF AGRONOMY

Issued on the 15th day of each month at Geneva, N.Y., U.S.A.

Contains original articles on research, teaching, and extension in soils and crops. Approximately 1000 pages a year and includes the proceedings of the annual meeting of the Society. Numerous back numbers also available.

Subscription price, $5.00 per volume (12 numbers) in the United States and Canada; $5.50 elsewhere. Sample copies supplied upon request.

### GENERAL INDEXES (AUTHOR AND SUBJECT) TO THE JOURNAL

Index of Vols. 1-20, inclusive (1907-1928), 44 pages with covers $0.50 post paid

Index of Vols. 21-30, inclusive (1929-1938), 83 pages with covers $1.00 post paid

### PROCEEDINGS OF THE SOIL SCIENCE SOCIETY OF AMERICA

Published annually at Geneva, N.Y., U.S.A.

Contains papers given at the annual meetings of the Society; also reports and business transactions.

$5.00 per volume post paid

| | |
|---|---|
| Vol. 1 (1936), 526 pages, illus. | Vol. 5 (1940), 448 pages, illus. |
| Vol. 2 (1937), 602 „ „ | Vol. 6 (1941), 521 „ „ |
| Vol. 3 (1938), 370 „ „ | Vol. 7 (1942), 517 „ „ |
| Vol. 4 (1939), 455 „ „ | Vol. 8 (1943), 473 „ „ |

### PROCEEDINGS OF THE FIRST INTERNATIONAL CONGRESS OF SOIL SCIENCE

Volumes 1 to 4 (Commissions I, II, III and IV, and V and VI, respectively)
$2.50 per set of 4 volumes, post paid

### BULLETIN OF THE AMERICAN SOIL SURVEY ASSOCIATION (Discontinued)

Nos. XI (1930), XIII (1932), XIV (1933), XV (1934), XVI (1935)
$2.50 each, post paid

ADDRESS ALL COMMUNICATIONS TO
J. D. LUCKETT, *Editor*
American Society of Agronomy
and
Soil Science Society of America
GENEVA, N.Y., U.S.A.

# CANADIAN JOURNAL OF RESEARCH

Established as a medium for the publication, in Canada, of the results of original scientific research carried out in the Dominion, the *Canadian Journal of Research* is published by the National Research Council of Canada under the authority of the Chairman of the Committee of the Privy Council on Scientific and Industrial Research. It is edited by a joint Editorial Board consisting of members of the National Research Council of Canada, the Royal Society of Canada, and the Chemical Institute of Canada.

The *Canadian Journal of Research* is at present issued in six sections as follows:

A. Physical Sciences
B. Chemical Sciences
C. Botanical Sciences
D. Zoological Sciences
E. Medical Sciences
F. Technology

Each of these sections is issued six times a year—at bi-monthly intervals—under separate cover, with separate pagination.

The annual subscription rates are:

| | |
|---|---|
| Any one section .. .. | $2.00 |
| Any two sections .. .. | $3.00 |
| Any three sections .. .. | $4.00 |
| Any four sections .. .. | $5.00 |
| Any five sections .. .. | $6.00 |
| Any six sections .. .. | $6.00 |

Requests for information should be sent to the Editor-in-chief and remittances made payable to the National Research Council, Ottawa, Canada.

# THE IMPERIAL BUREAU OF PLANT BREEDING AND GENETICS,

## School of Agriculture, Cambridge, England.

*Consultant Director:*
PROF. SIR FRANK L. ENGLEDOW, C.M.G., M.A., Drapers' Professor of Agriculture.

*Director:* P. S. HUDSON, Ph.D.

*Assistants:* MISS M. L. C. WILSON, B.A.
R. H. RICHENS, M.A.
MISS T. ASHTON, M.A.

### Publications:

### PLANT BREEDING ABSTRACTS.

Issued quarterly. Subscription 25/-, with Subject Index. (Subscriptions sent direct from within the British Commonwealth of Nations are subject to a reduction of 5/-). Single copies 7/6 each. Drafts should be made out in sterling currency.

Back numbers: Vols I—V, 35/- per volume, single numbers 15/-, other Vols 25/-, single numbers 7/6.

Copies of "Plant Breeding Abstracts" printed on one side of the paper can be supplied, for the convenience of readers wishing to cut up and file the references, at an additional cost of 5/- per volume.

**Important Note.**—Every effort is made to make Plant Breeding Abstracts as complete as possible and its notices of papers referring to plant breeding or the genetics of crop plants as prompt as possible. To aid in this, authors are invited to send to the Deputy Director copies of their papers immediately on publication.

### Other Publications :

| TECHNICAL COMMUNICATIONS | s. | d. |
|---|---|---|
| Joint Publication No. 1. Vernalization and Phasic Development of Plants .. | 10 | 0 |
| An Outline of Cytological Technique for Plant Breeders .. .. .. .. | 1 | 6 |
| The Action and Use of Colchicine in the Production of Polyploid Plants, by J. L. Fyfe .. .. .. .. | 1 | 0 |
| Field Trials: their Lay-out and Statistical Analysis by John Wishart .. .. | 2 | 6 |
| Joint Publication No. 3. The Breeding of Herbage Plants in Scandinavia and Finland .. .. .. .. .. | 4 | 0 |
| Potato Collecting Expeditions in Mexico and South America, by J. G. Hawkes .. | 3 | 0 |
| New and Promising Varieties recently described in the Literature (Six issues) .. .. .. .. each | 1 | 0 |
| Joint Publication No. 5. The Production of Seed of Root Crops and Vegetables | 3 | 0 |
| Photoperiodism in the Potato, by C. M. Driver and J. G. Hawkes .. .. | 2 | 6 |
| Potato Collecting Expeditions in Mexico and South America. II. Systematic Classification of the Collections, by J. G. Hawkes .. .. .. .. | 7 | 6 |
| Cultivation and Breeding of Russian Rubber-bearing Plants .. .. .. | 2 | 6 |

| INDEXES | s. | d. |
|---|---|---|
| Subject Index to Vols I to V of Plant Breeding Abstracts .. .. .. | 2 | 6 |
| Subject Index to Vols VI to VIII of Plant Breeding Abstracts .. .. .. | 2 | 6 |
| Subject Index to Vols IX, X, XI, and XII of Plant Breeding Abstracts .. each | 2 | 6 |

| BIBLIOGRAPHICAL MONOGRAPHS | s. | d. |
|---|---|---|
| Bibliography on Interspecific and Intergeneric Hybridization in Relation to Plant Breeding .. .. .. .. | 2 | 0 |
| Rye Breeding Bibliography .. .. | 1 | 6 |
| Bibliography on Breeding Sorghums and Millets .. .. .. .. .. | 1 | 0 |
| The Experimental Production of Haploids and Polyploids .. .. .. .. | 2 | 6 |
| Tobacco Breeding Bibliography .. .. | 1 | 0 |
| Bibliography of Baking Quality Tests, Supplement .. .. .. .. | 1 | 6 |
| Bibliography on Insect Pest Resistance in Plants .. .. .. .. .. | 1 | 6 |

Subscriptions to any of the above Publications should be sent to Imperial Agricultural Bureaux, Central Sales Branch, Penglais, Aberystwyth, Wales.

*Loss in Transit.*—Claims for numbers of Plant Breeding Abstracts lost in transit will only be considered if notice of such loss is received within three months of the date of posting.

# IMPERIAL AGRICULTURAL BUREAUX

## JOURNALS PUBLISHED BY BUREAUX ON RELATED SUBJECTS

| | Published by the |
|---|---|
| Herbage Abstracts | Imperial Bureau of Pastures and Forage Crops, Aberystwyth. |
| Forestry Abstracts | Imperial Forestry Bureau, Oxford. |
| Horticultural Abstracts | Imperial Bureau of Horticulture and Plantation Crops, East Malling. |
| Soils and Fertilizers | Imperial Bureau of Soil Science, Harpenden. |

Annual subscription to the above journals is 25s. (with a special reduction of 20 per cent for orders received direct from subscribers in Great Britain, the Dominions and Colonies).

## RECENT AND FORTHCOMING OCCASIONAL PUBLICATIONS ON AGRICULTURE AND FORESTRY

### I.A.B. JOINT PUBLICATIONS

No.

6. Alternate husbandry.
   Imperial Bureaux of Pastures and Forage Crops, Soil Science, Animal Breeding and Genetics and Animal Health.
   May, 1944. Price: 5s. 0d.

7. Imperata cylindrica: its economic significance and control.
   Imperial Forestry Bureau and the Imperial Bureau of Pastures and Forage Crops.
   May, 1944 Price: 2s. 6d.

### TECHNICAL COMMUNICATIONS, ETC.

**Imperial Bureau of Plant Breeding and Genetics, Cambridge.**

New and Promising Varieties recently described in the Literature. Six issues. each 1s. 0d.

**Imperial Bureau of Pastures and Forage Crops, Aberystwyth.**

31. The provision of animal fodder in tropical and sub-tropical countries. Part I. August, 1944 .. .. .. .. .. .. .. .. .. 4s. 0d.
32. Advances in grassland husbandry and fodder production. First symposium. August, 1944 .. .. .. .. .. .. .. 4s. 0d.
33. Ley farming in Sweden: a Field Day at Svalöf. March, 1945 .. .. 3s. 0d.
34. The establishment and early management of grass-legume mixtures. June, 1945 .. .. .. .. .. .. .. .. .. 7s. 0d.
35. The forage resources of Latin America: El Salvador. By J. M. Watkins. August, 1945. .. .. .. .. .. .. .. .. .. 2s. 6d.

**Imperial Forestry Bureau, Oxford.**

2. Co-operation in forestry. November, 1944 .. .. .. .. .. 4s. 0d.
3. Forestry credit. By I. Kissin. January, 1945 .. .. .. .. 2s. 6d.

**Imperial Bureau of Horticulture and Plantation Crops, East Malling.**

14. Propagation by cuttings and layers. Recent work and its application, with special reference to pome and stone fruits. R. J. Garner. January, 1944. 3s. 6d.

**Imperial Mycological Institute, Kew.**

9. West African Meliolineae. 1. Meliolineae on Malvaceae and Tiliaceae. By F. C. Deighton. July, 1944 .. .. .. .. .. .. 3s. 9d.
10. Notes on Indian fungi. II. By G. Watts Padwick and Azmatullah Khan. 1944. .. .. .. .. .. .. .. .. .. 3s. 0d.

All correspondence regarding subscriptions to current and back volumes of abstracting journals and the purchase of Occasional Publications, Technical Communications, Bulletins, Bibliographies, etc., to be sent to—Imperial Agricultural Bureaux, Central Sales Branch, Penglais, ABERYSTWYTH, Great Britain.

PRINTED BY W. HEFFER & SONS LTD., CAMBRIDGE, ENGLAND